HP ProLiant BL40p Server Blade Maintenance and Service Guide

June 2003 (Second Edition)
Part Number 316079-002

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About This Guide

This maintenance and service guide can be used for reference when servicing ProLiant BL40p server blades.

WARNING: To reduce the risk of personal injury from electric shock and hazardous energy levels, only authorized service technicians should attempt to repair this equipment. Improper repairs can create conditions that are hazardous.

Audience Assumptions

This guide is for service technicians. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels and are familiar with weight and stability precautions for rack installations.

Technician Notes

WARNING: Only authorized technicians trained by HP should attempt to repair this equipment. All troubleshooting and repair procedures are detailed to allow only subassembly/module-level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard.

WARNING: To reduce the risk of personal injury from electric shock and hazardous energy levels, do not exceed the level of repairs specified in these procedures. Because of the complexity of the individual boards and subassemblies, do not attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create conditions that are hazardous.

WARNING: To reduce the risk of electric shock or damage to the equipment:

- **Disconnect power from the system by unplugging all power cords from the power supplies.**
- **Do not disable the power cord grounding plug. The grounding plug is an important safety feature.**
- **Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.**

CAUTION: To properly ventilate the system, you must provide at least 7.6 cm (3.0 in) of clearance at the front and back of the server.

CAUTION: The computer is designed to be electrically grounded (earthed). To ensure proper operation, plug the AC power cord into a properly grounded AC outlet only.

NOTE: Any indications of component replacement or printed wiring board modifications may void any warranty.

Where to Go for Additional Help

In addition to this guide, the following information sources are available:

- *HP ProLiant BL p-Class System Setup and Installation Guide*
- *HP ProLiant BL p-Class System Hardware Installation and Configuration* poster
- *HP Servers Troubleshooting Guide*
- *Altiris eXpress Deployment Server for ProLiant Servers User Guide*
- *Integrated Lights-Out User Guide*
- *ROM-Based Setup and Utility User Guide*
- White paper: HP *ProLiant BL p-Class System Overview and Planning*
- White paper: *Configuring a Preboot eXecution Environment (PXE) using Red Hat Linux 7.2 on HP ProLiant Servers*
- QuickSpecs
- *Service Quick Reference Guide*

Integrated Management Log

The server includes an integrated, nonvolatile management log that contains fault and management information. The contents of the Integrated Management Log (IML) can be viewed with Insight Manager.

Telephone Numbers

For the name of the nearest HP authorized reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.

For HP technical support:

- In the United States and Canada, call 1-800-652-6672.
- Outside the United States and Canada, refer to

  www.hp.com

1

Illustrated Parts Catalog

This chapter provides illustrated parts and spare parts lists for the HP ProLiant BL40p server blade components. Table 1-1 lists the referenced spare parts.

ProLiant BL40p Server Blade Components

Mechanical Exploded View

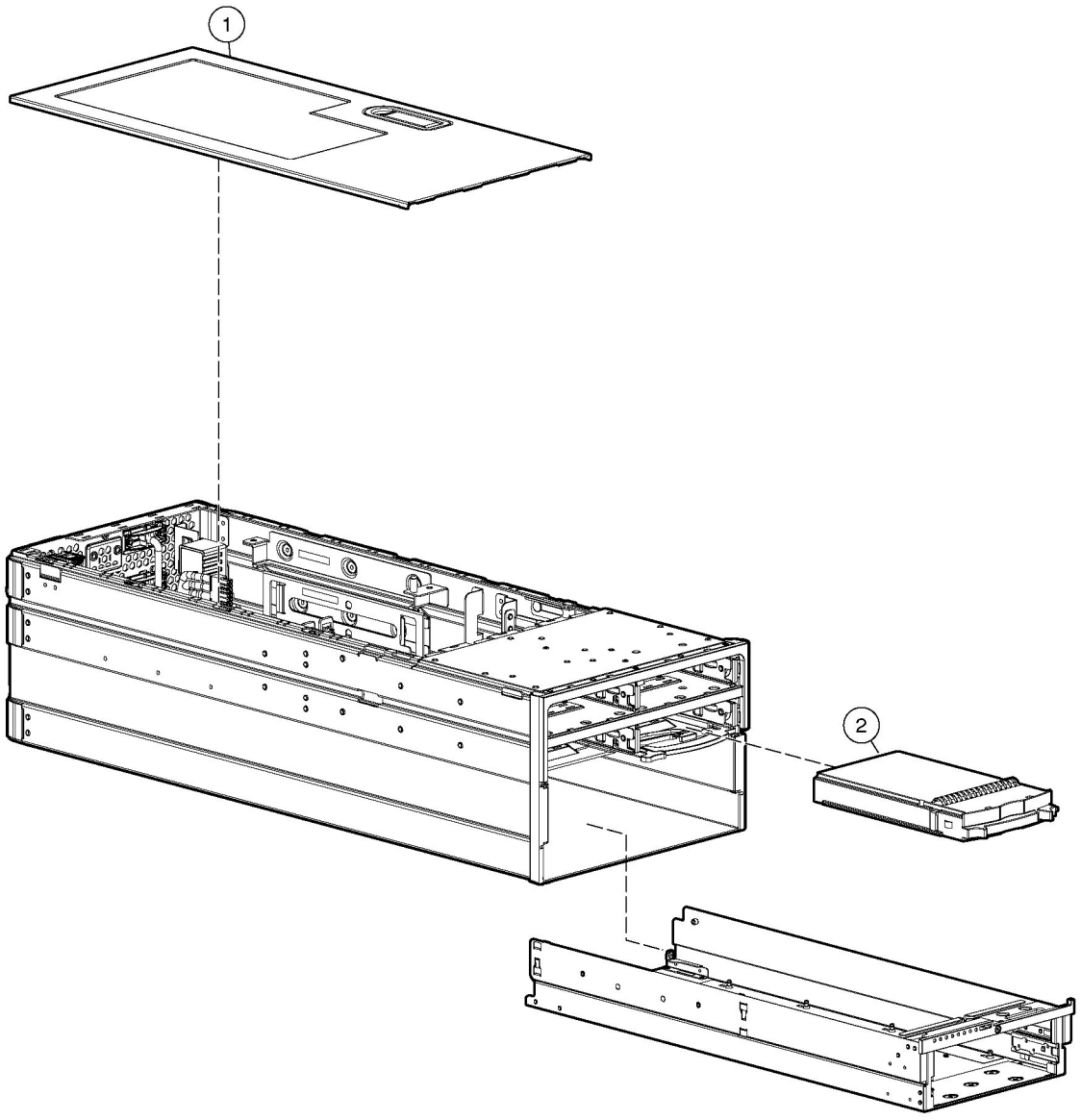

Figure 1-1: ProLiant BL40p server blade mechanical components

System Exploded View

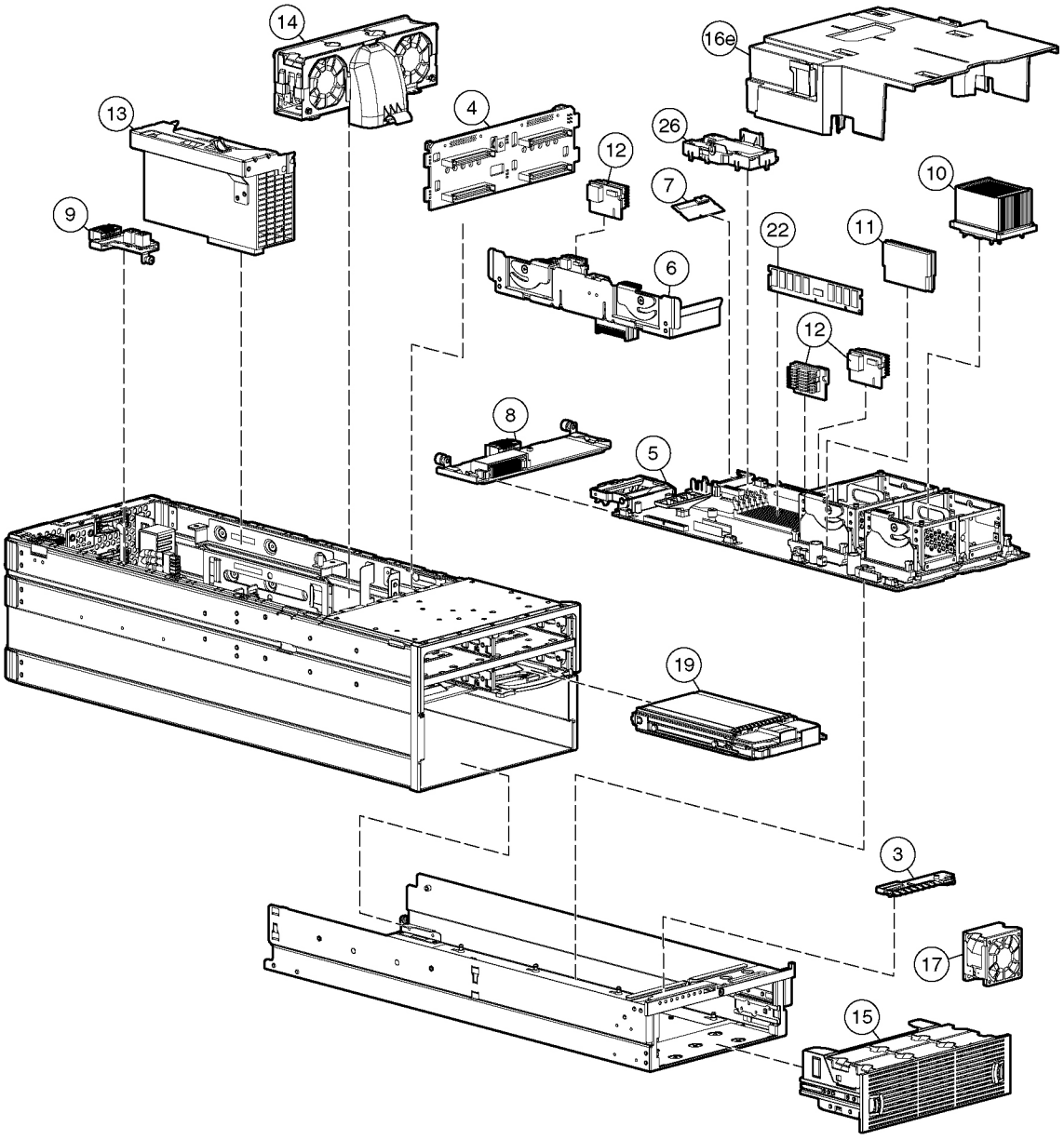

Figure 1-2: ProLiant BL40p server blade system components

Server Blade Spare Parts List

Table 1-1: Server Blade Spare Parts List

Item	Description	Spare Part Number
	Mechanical Components	
1	Access panel	314456-001
2	Hard drive blank	122759-001
	Boards	
3	Front panel power button/LED board	303478-001
4	SCSI backplane board	303474-001
5	System board	303475-001
6	PCI-X mezzanine board	303477-001
7	HP Smart Array 5i Controller module	260741-001
8	NIC I/O board	303473-001
9	Ethernet passthrough board	303476-001
	System Components	
10	Intel® Xeon processor with heatsink	
10a	1.5 GHz, 1-MB L3 cache *	309617-001
10b	2.0 GHz, 1-MB L3 cache *	327839-001
10c	2.0 GHz, 2-MB L3 cache *	309618-001
10d	2.8 GHz, 2-MB L3 cache *	327841-001
	(reserved)	
	(reserved0	
11	Processor power module (PPM)	298564-001
12	System board/PCI-X mezzanine power modules	307645-001
13	Power converter, 48-V	303481-001
14	SCSI fan cage assembly	303479-001
15	Processor fan cage assembly	303480-001
	Miscellaneous	
16	Plastics and kit	314455-001
16a	PCI-X latch assembly *	
16b	PCI-X retainer guide *	
16c	SCSI fan baffle *	
16d	System board tray assembly ejector latch *	

* Not Shown

continued

Table 1-1: Server Blade Spare Parts List *continued*

Item	Description	Spare Part Number
16e	Processor baffle cover	
16f	LED power switch bezel *	
16g	Drive cage bezel *	
16h	Mate left bezel *	
16i	Mate upper right bezel *	
16j	Mate lower right bezel *	
16k	SCSI fan latch, left *	
16l	System board tray assembly ejector lever *	
16m	Battery carrier *	
17	Fans	314453-001
18	Cable kit *	314454-001
18a	RJ-45 signal board *	
18b	Power button/LED board *	
18c	Processor fans *	
18d	SCSI I2C *	
18e	External power *	
18f	SCSI fan board *	
18g	SCSI backplane power *	
18h	Ultra3 SCSI port 1 *	
18i	Ultra3 SCSI port 2 *	
	Hard Drives	
19	Hot-plug SCSI hard drive, 18 GB, 15K RPM	289240-001
19a	Hot-plug SCSI hard drive, 36 GB, 10K RPM *	289041-001
19b	Hot-plug SCSI hard drive, 36 GB, 15K RPM *	289241-001
19c	Hot-plug SCSI hard drive, 72 GB, 10K RPM *	289042-001
19d	Hot-plug SCSI hard drive, 72 GB, 15K RPM *	289243-001
19e	Hot-plug SCSI hard drive, 146 GB, 10K RPM *	289044-001
20	Replacement battery, 3-V lithium *	179322-001
21	Return kit *	323089-001

* Not shown

continued

Table 1-1: Server Blade Spare Parts List *continued*

Item	Description	Spare Part Number
	Memory	
22	DIMM, 256-MB, registered, PC2100 ECC DDR	300699-001
23	DIMM, 512-MB, registered, PC2100 ECC DDR *	300700-001
24	DIMM, 1-GB, registered, PC2100 ECC DDR *	300701-001
25	DIMM, 2-GB, registered, PC2100 ECC DDR *	300702-001
	Options	
26	Battery-Backed Write Cache Enabler, with cable	260740-001

* Not shown

2

Removal and Replacement Procedures

This chapter provides subassembly/module-level removal and replacement procedures for system components. After completing all necessary removal and replacement procedures, verify that all components operate properly by running the appropriate diagnostic software:

- For server blade components, run the Server Diagnostics utility, available from the HP website:

  www.hp.com

- For server blade enclosure and power enclosure components, run the infrastructure diagnostics. Refer to Chapter 3, "Diagnostic Tools," for more information.

Safety Considerations

Electrostatic Discharge Information

A discharge of static electricity can damage static-sensitive devices or microcircuitry. Proper packaging and grounding techniques are necessary precautions to prevent damage. To prevent electrostatic damage, observe the following precautions:

- Transport products in static-safe containers such as conductive tubes, bags, or boxes.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.
- Cover workstations with approved static-dissipating material. Use a wrist strap connected to the work surface and properly grounded tools and equipment.
- Keep the work area free of nonconductive materials such as ordinary plastic assembly aids and foam packing.
- Always be properly grounded when touching a static-sensitive component or assembly.
- Use conductive field service tools.

Server Blade Warnings and Cautions

WARNING: To reduce the risk of shock or injury from high current electrical energy, do not remove the server blade access panel while the server blade is installed in the server blade enclosure. Do not remove the server blade access panel and then install the server blade into the server blade enclosure.

WARNING: Setting the server blade Power On/Standby button to the standby position removes power from most areas of the server blade. This process may take 30 seconds, during which time some internal circuitry remains active. To remove power completely, remove the server blade from the server blade enclosure.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

CAUTION: When performing non-hot-plug operations, you must power down the server blade and/or the system. However, it may be necessary to leave the server blade powered up when performing other operations, such as hot-plug installations or troubleshooting.

Rack Warnings and Cautions

WARNING: The power supply enclosure and the server blade enclosure are very heavy. To reduce the risk of personal injury or damage to the equipment:

- **Observe local occupational health and safety requirements and guidelines for manual material handling.**
- **Remove hot-plug power supplies and server blades from their enclosures before installing or removing the enclosures.**
- **Use caution and get help to lift and stabilize enclosures during installation or removal, especially when the enclosure is not fastened to the rack.**

WARNING: Always use at least two people to lift a power supply enclosure or server blade enclosure into the rack. If the enclosure is being loaded into the rack above chest level, a third person MUST assist with aligning the enclosure with the rails while the other two people support the weight of the enclosure.

WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- **The leveling jacks of the rack are extended to the floor.**
- **The full weight of the rack rests on the leveling jacks.**
- **The stabilizers are attached to the rack if it is a single rack installation.**
- **The racks are coupled in multiple rack installations.**

WARNING: When installing the server blade enclosure in a telco rack, be sure that the rack frame is adequately secured to the building structure.

WARNING: To reduce the risk of personal injury or damage to the equipment, at least two people are needed to safely unload the rack from the pallet. An empty 42U rack weighs 115 kg (253 lb), is over 2.1 m (7 ft) tall, and may become unstable when being moved on its casters. Do not stand in front of the rack as it rolls down the ramp from the pallet, but handle the rack from both sides.

WARNING: To reduce the risk of shock or injury from high current electrical energy, do not reach into a server blade enclosure once it has been installed in a rack and connected to a working rack bus bar. Do not touch the power or data backplanes within the server blade enclosure once it has been installed.

WARNING: To reduce the risk of shock or injury from high current electrical energy, do not reach into a power supply enclosure once it has been installed in a rack and connected to a power source. Do not touch the connectors within the power supply enclosure once it has been installed.

WARNING: To reduce the risk of shock or injury from high current electrical energy, do not open any access covers on the rack bus bar after it has been connected to a power source.

CAUTION: Protect equipment from power fluctuations and temporary interruptions with a regulating UPS device or battery bank. This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system in operation during a power failure.

CAUTION: Always ensure that equipment is properly grounded before beginning any installation procedure. Electrostatic discharge resulting from improper grounding can damage electronic components. For more information, refer to the setup and installation guide.

Symbols on Equipment

25 kg
55 lb

Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching it.

To reduce the risk of injury from electric shock hazards, do not open this enclosure.

WARNING: Any surface or area of the equipment marked with these symbols indicates the presence of electric shock hazards. The enclosed area contains no operator serviceable parts.

Any RJ-45 receptacle marked with these symbols indicates a Network Interface Controller (NIC).

WARNING: To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

Server Blade Components

Use the procedures in this section to perform service events on ProLiant BL40p server blades.

NOTE: Slate blue components denote serviceable parts.

Server Blade Preparation

To service any internal server blade component, you must power down the server blade and remove it from the server blade enclosure.

CAUTION: Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning any installation procedure. For more information, refer to the "Electrostatic Discharge Information" section in this chapter.

System power in server blades does not completely shut off with the front panel Power On/Standby switch or Integrated Lights-Out (iLO) Virtual Power Button feature. The function toggles between on and standby modes, rather than on and off. The standby position removes power from most electronics and the drives, but portions of the power supply and some internal circuitry remain active.

To service internal server blade components:

1. Identify the proper server blade in the server blade enclosure.
2. Remove power from the server blade in one of the following ways:
   - Use the Virtual Power Button feature in the iLO Remote Console to power down the server blade from a remote location. Be sure that the server blade is in standby mode by observing that the power LED is amber.
   - Press the Power On/Standby button on the front of the server blade. Be sure that the server blade is in standby mode by observing that the power LED is amber.

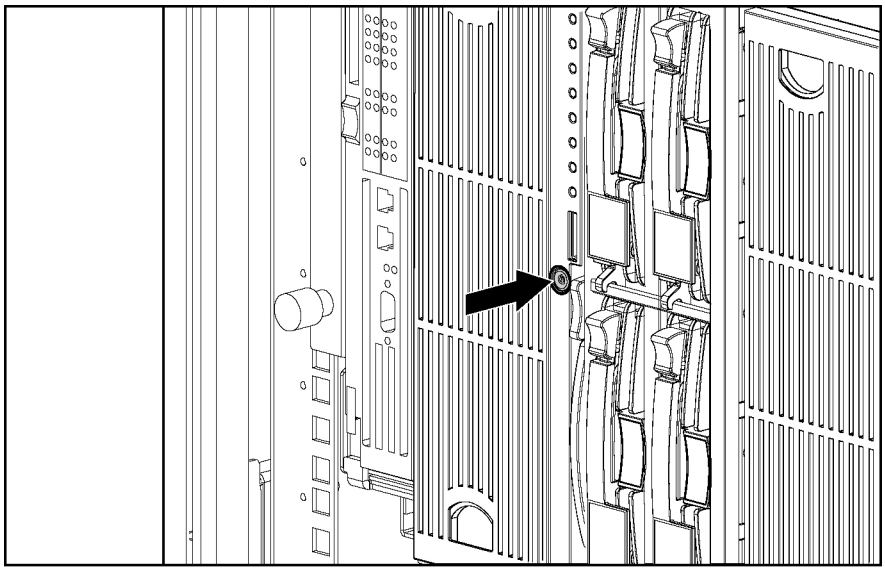

Figure 2-1: Pressing the Power On/Standby button

CAUTION: After you press the release button, the server blade is unlocked from the server blade enclosure. Use both hands to support the server blade when you remove it from the rack.

3. Remove the server blade from the server blade enclosure:
   a. If the server blade is installed in either of the end bays and has a fibre channel host-bus adapter card installed in a PCI-X slot, raise the locking handle at the back of the server blade to unlock it from the server blade enclosure.

CAUTION: To avoid damaging the equipment, be sure to unplug any fibre channel host-bus adapter card cables from the rear of the server blade before removing the server blade from the server blade enclosure.

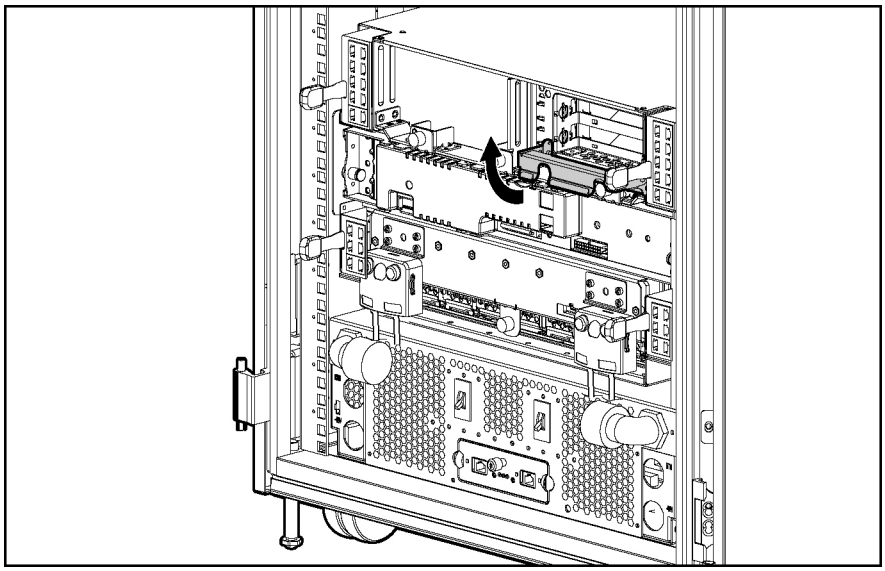

Figure 2-2: Unlocking the server blade from the server blade enclosure

b. Press the button to release the locking lever (1).

c. Pull open the locking lever (2).

d. Grasp the lever and slide the server blade from the server blade enclosure (3). Place a hand under the server blade to support it as you remove it from the enclosure.

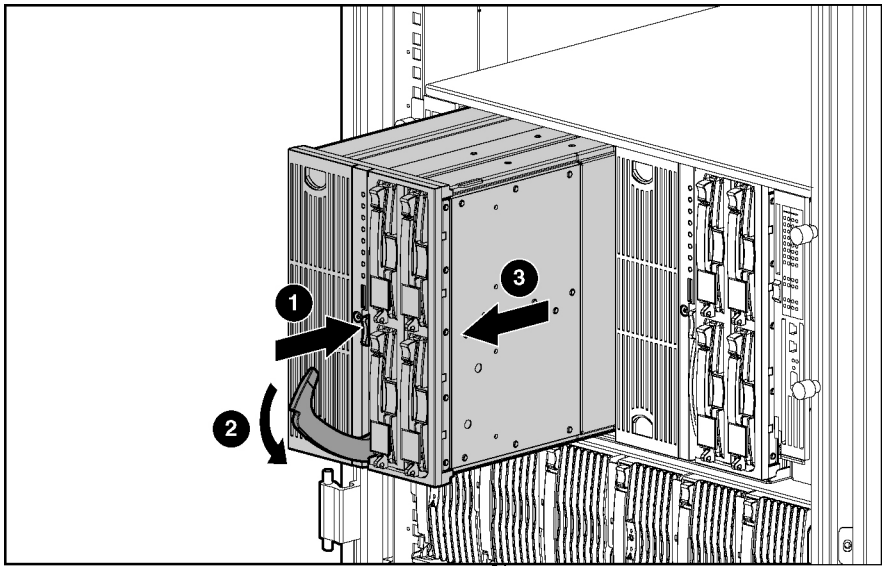

Figure 2-3: Removing the server blade from the server blade enclosure

4. Place the server blade on a flat, level surface.

CAUTION: Always populate server blade enclosure bays with either a server blade or server blade blank. Operating the server blade enclosure without a server blade or server blade blank results in improper airflow and improper cooling that can lead to thermal damage.

Reverse steps 1 through 3 to install and power up a server blade. Server blades are set to power up automatically upon insertion. If you have changed this setting, use the Power On/Standby button or iLO Virtual Power Button feature to power up the server blade.

For more information about iLO, refer to the *Integrated Lights-Out User Guide*.

If you are not installing the server blade into either of the end bays, you will need to remove the locking handle at the back of the server blade before installing it into the server blade enclosure. To remove the locking handle:

1. Use a Torx-15 screwdriver to remove the three screws from the locking handle (1).
2. Remove the locking handle from the back of the server blade.

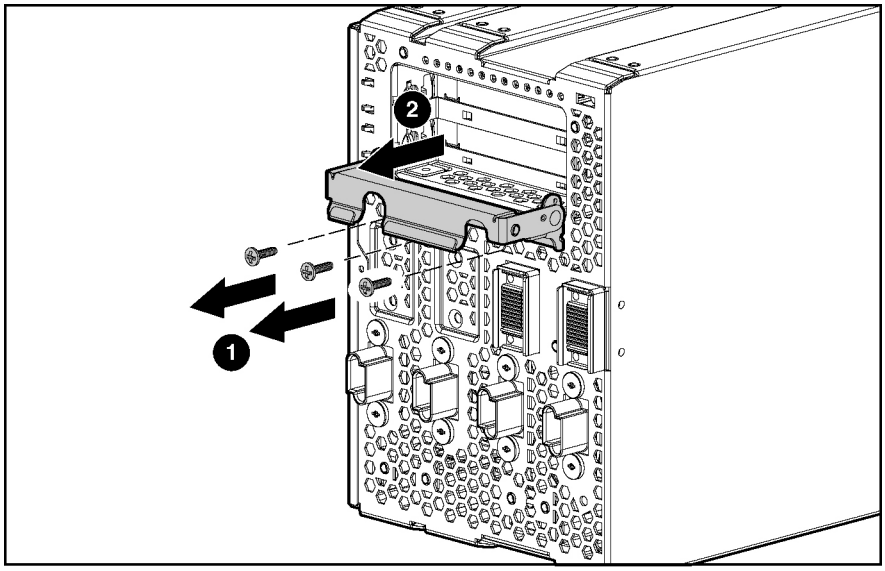

Figure 2-4: Removing the locking handle

Access Panel

To remove the access panel:

1. Power down the server blade and remove it from the server blade enclosure. Refer to the "Server Blade Preparation" section in this chapter.
2. Lift up on the hood latch handle until the access panel disengages from the chassis (1).
3. Slide the access panel about 1.3 cm (0.5 in) toward the rear of the unit and lift the panel to remove it (2).

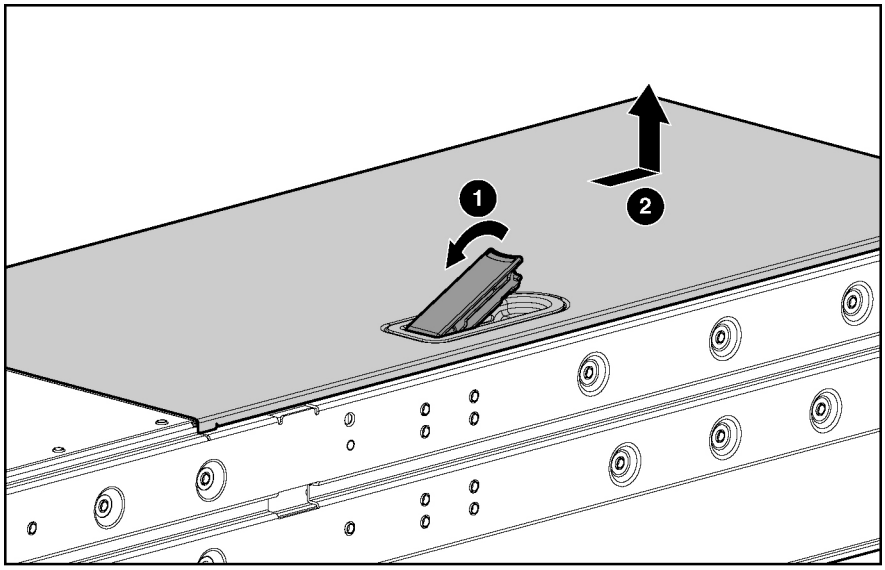

Figure 2-5: Removing the server blade access panel

Reverse steps 1 through 3 to replace the access panel.

Removing the System Board Tray Assembly

The system board tray assembly must be removed from the chassis for the replacement of some components, but is not required for all preparation procedures. Refer to the instructions for replacing a specific option to determine whether the system board tray must be removed. Refer to Figure 2-6 for connector locations on the system board. To remove the system board tray assembly:

CAUTION: All power must be removed from the server blade before performing these procedures.

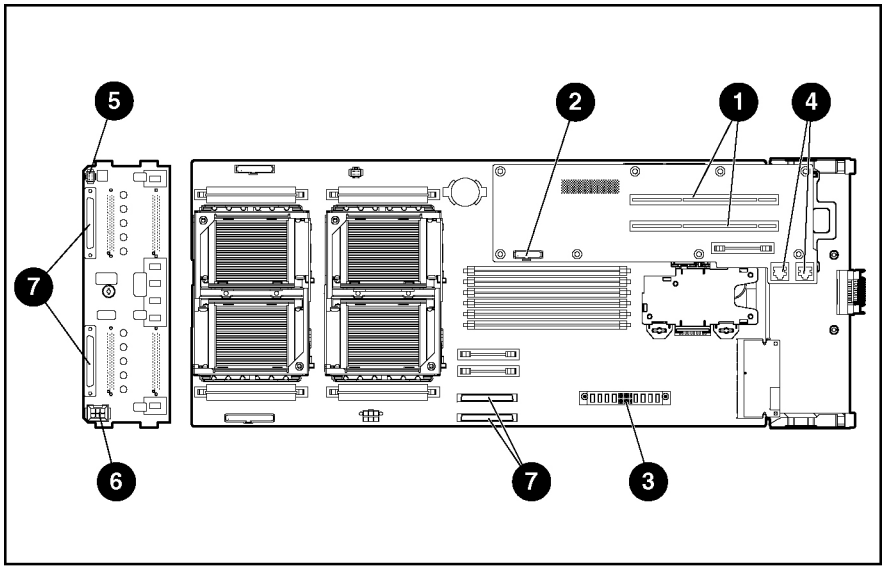

Figure 2-6: System board tray assembly removal connector locations

Table 2-1: System Board Tray Assembly Removal Connector Locations

Item	Component	User Task
1	PCI-X mezzanine slots	Remove any installed PCI-X host-bus adapter cards
2	Fan cable	Disconnect from the PCI-X mezzanine board
3	DC power converter	Disconnect from system board
4	RJ-45 cables	Disconnect from PCI-X mezzanine board
5	SCSI I2C cable	Disconnect from SCSI backplane board and secure to processor baffle
6	SCSI backplane power cable	Disconnect from SCSI backplane board and secure to processor baffle
7	SCSI cables	Disconnect from system board and SCSI backplane board

1. Remove the access panel. Refer to Figure 2-5 in this chapter.
2. Remove any installed PCI-X host-bus adapter cards.

3. Remove the three-fan assembly:
   a. Disconnect the fan cable from the PCI-X mezzanine board (1).
   b. Pull out the slate blue fan clips located underneath the assembly (2).
   c. Lift the assembly out of the chassis (3).

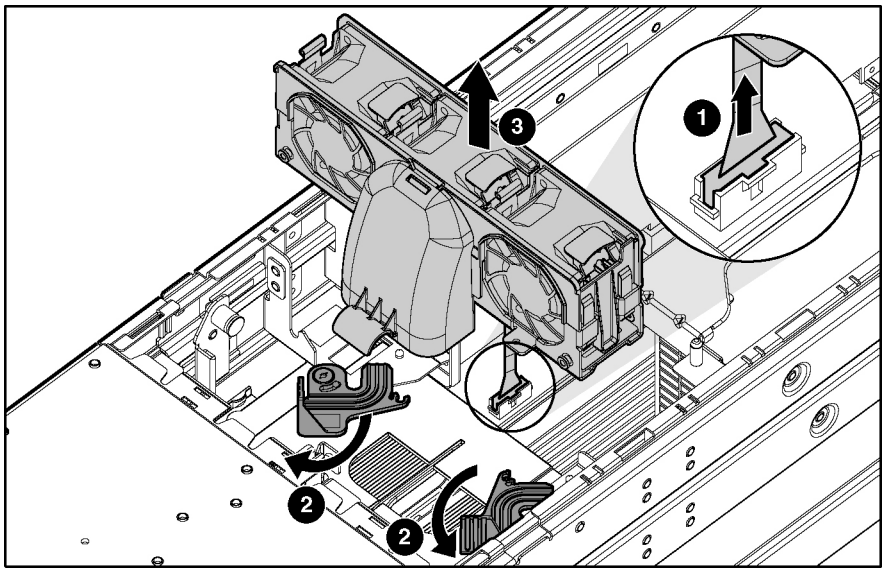

Figure 2-7: Removing the three-fan assembly

4. Remove the DC power converter from the system board. Refer to the label on the DC power converter for details.
5. Disconnect the RJ-45 cables from the PCI-X mezzanine board.

6. Carefully disconnect the SCSI I2C cable and the SCSI backplane power cable from the SCSI backplane board:
   a. Open the chassis doors on either side of the SCSI backplane board for easier access to the cables. Refer to Figure 2-31 for details.
   b. Pinch the cable clips, and pull the cables out of the connectors.

CAUTION: The SCSI I2C cable and the SCSI backplane power cable must remain attached to the system board at this point. To avoid damaging the system board, remove only the ends connected to the SCSI backplane board.

Be sure to pinch the cable clips before pulling the cables out.

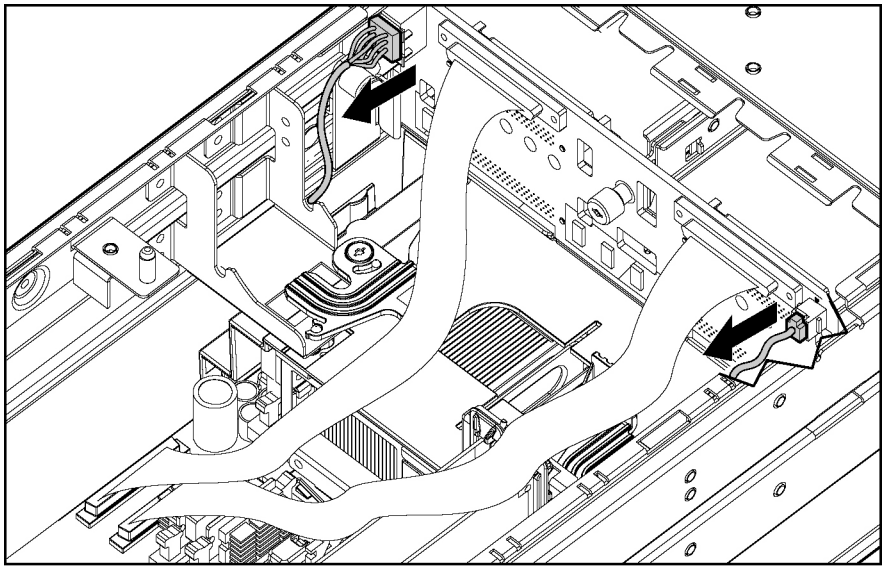

Figure 2-8: Disconnecting the SCSI I2C cable and the SCSI backplane cable

7. Secure the SCSI I2C cable and the SCSI backplane power cable into the processor baffle.

NOTE: Figure 2-9 shows the system board tray assembly removed from the chassis for clarity.

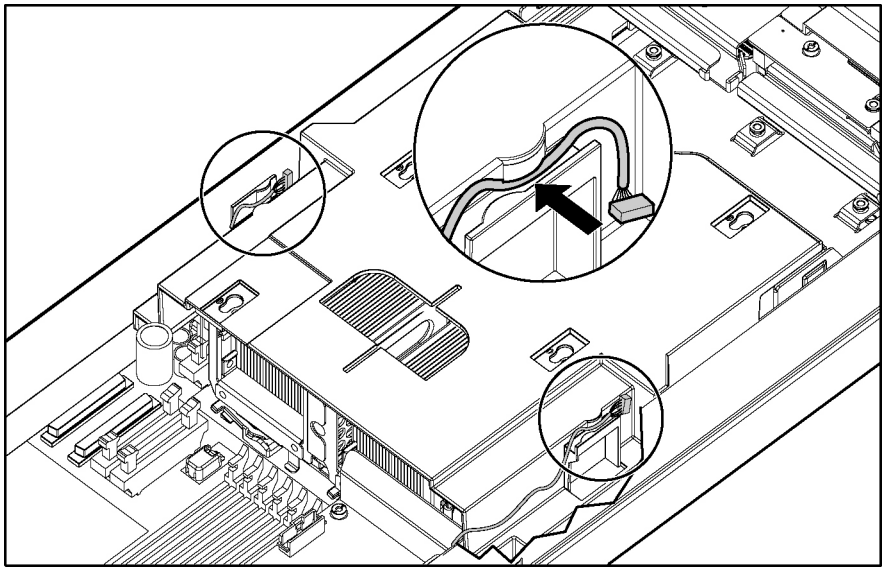

Figure 2-9: Attaching cables to the processor baffle

8. Disconnect both SCSI cables from the SCSI backplane board (1, 4) and from the system board (2, 3).

NOTE: Numbers 3 and 4 in Figure 2-10 reference ports A (short cable). Numbers 1 and 2 reference ports B (long cable). Crossing the cables can result in incorrect data presentation.

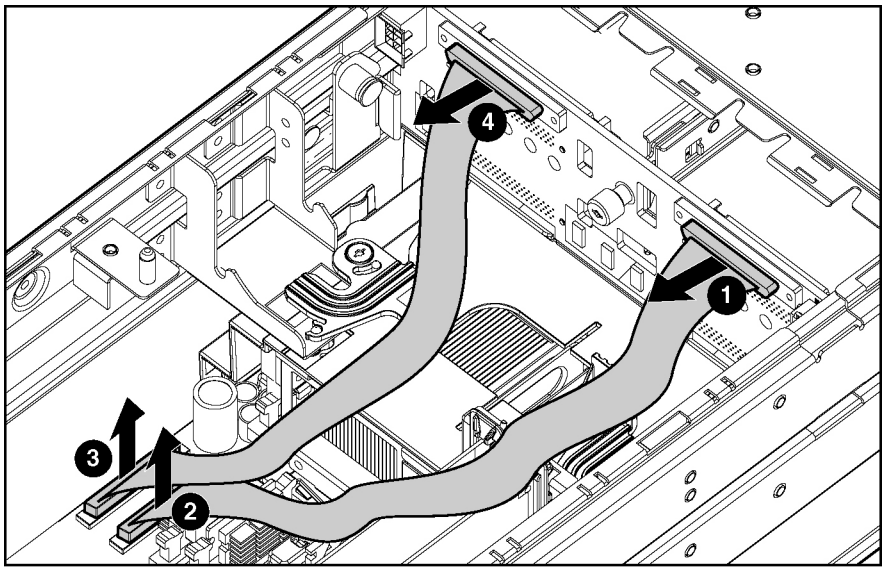

Figure 2-10: Disconnecting the SCSI cables

9. Lift the system board tray release latch (1) and turn a quarter turn to unlock the system board tray from the chassis (2).
10. Push the plastic hook to release the slate blue system board tray lever (3) and slowly pull it forward to slide the tray towards the front of the server blade (4).

IMPORTANT: To avoid damaging the equipment, be sure to lift all cables away from the system board before sliding the tray out.

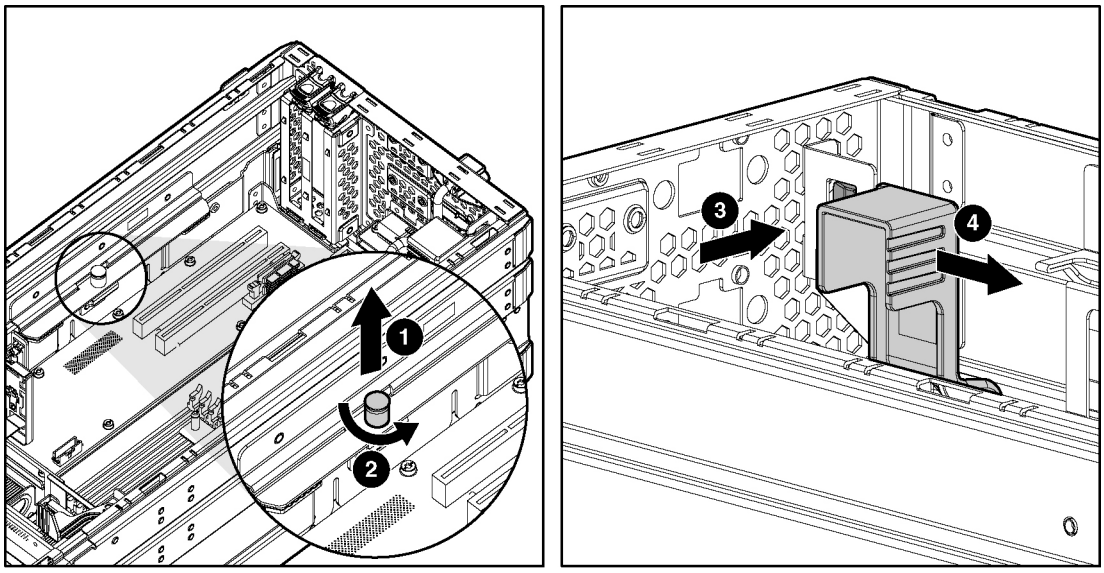

Figure 2-11: Unlocking the system board tray

11. When the system board tray lever is completely forward, slide the system board tray out of the chassis.

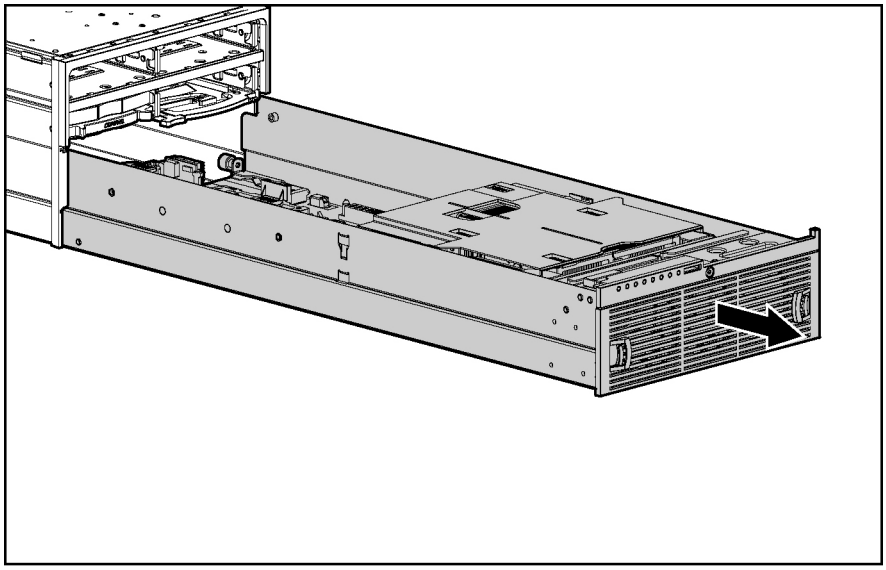

Figure 2-12: Removing the system board tray

To replace the system board tray, reverse steps 1 through 11.

Host-Bus Adapter Cards

The ProLiant BL40p server blade PCI-X expansion slots support only fibre channel host-bus adapter cards. To install a host-bus adapter card into a PCI-X slot:

1. Power down the server blade and remove it from the server blade enclosure. Refer to "Server Blade Preparation" in this chapter.
2. Remove the access panel. Refer to "Access Panel" in this chapter.
3. Remove the host-bus adapter card blank corresponding to PCI-X slot 1 by pressing down on the release lever (1), then pulling up (2).
4. Slide the slate blue host-bus adapter card blank out of the slot (3).

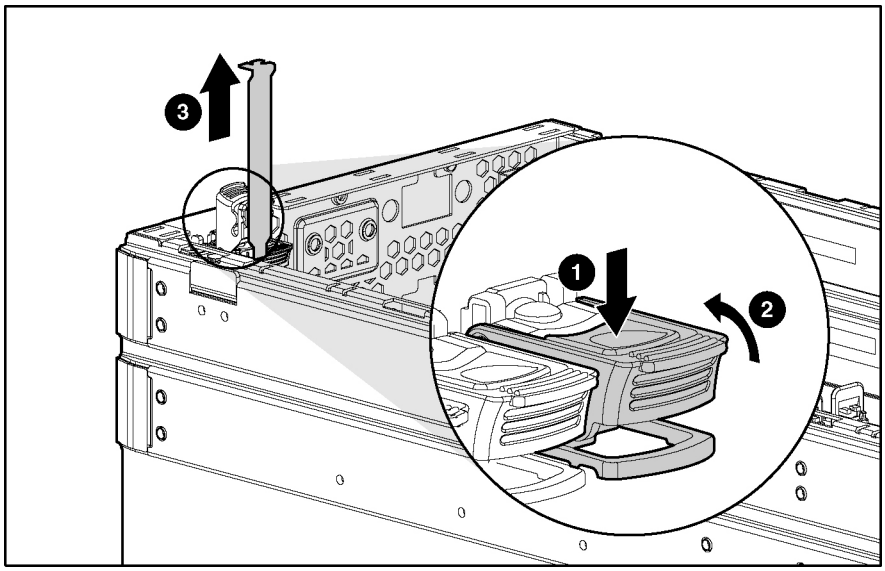

Figure 2-13: Removing host-bus adapter card blanks

5. Open the slate blue alignment guide (1).
6. Install the host-bus adapter card into PCI-X slot 1 (2).
7. Close the slate blue alignment guide (3)
8. Close the release lever (4).

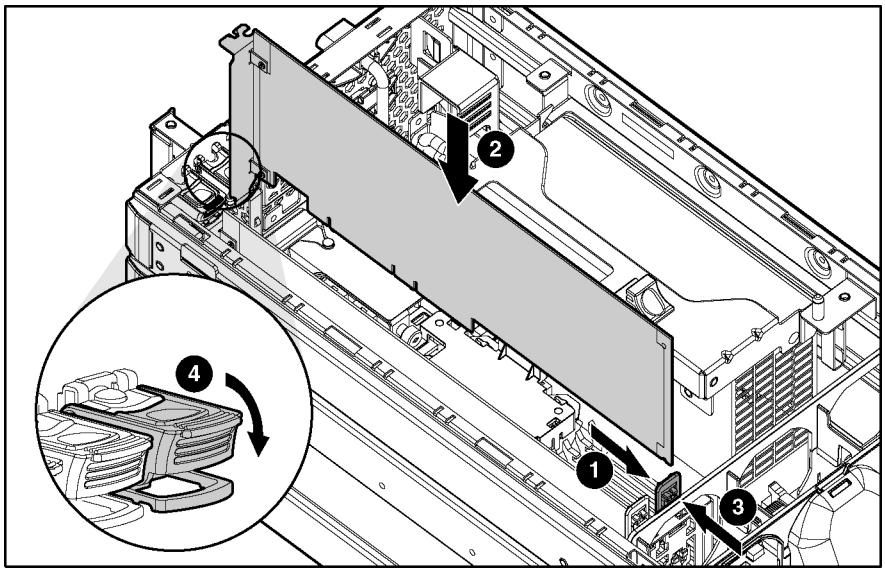

Figure 2-14: Installing a host-bus adapter card

9. Repeat steps 2 through 6 for PCI-X slot 2 if installing an additional host-bus adapter card.
10. Reinstall the access panel.
11. Install the server blade into the server blade enclosure.
12. Cable the host-bus adapter card as necessary. Refer to the documentation included with the host-bus adapter card.

Hard Drive Blanks

To remove a hard drive blank:

1. Press the release buttons simultaneously (1).
2. Pull the blank out of the drive bay (2).

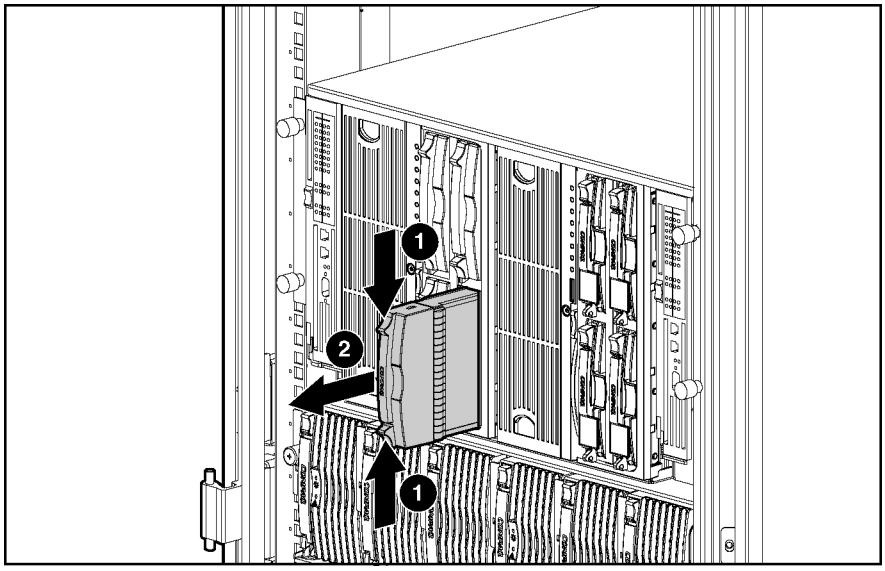

Figure 2-15: Removing a hard drive blank

CAUTION: Always populate hard drive bays with either a hot-plug SCSI hard drive or hard drive blank. Operating the server blade without a hot-plug SCSI hard drive or hard drive blank results in improper airflow and improper cooling that can lead to thermal damage.

To replace the hard drive blank, slide the blank into the bay until it locks into place.

Hot-Plug SCSI Hard Drives

To assess hard drive status, observe the hot-plug SCSI hard drive status LEDs. For a detailed explanation of these LEDs, refer to Chapter 4, "Connectors, LEDs, and Switches."

CAUTION: Read the section on hot-plug hard drive replacement in the *HP Servers Troubleshooting Guide* before removing a hard drive.

IMPORTANT: It is not necessary to power down the server blade before removing or replacing a hot-plug SCSI hard drive.

To remove a hot-plug SCSI hard drive:

1. Press the release button (1).
2. Open the ejector lever (2).
3. Slide the drive out of the drive cage (3).

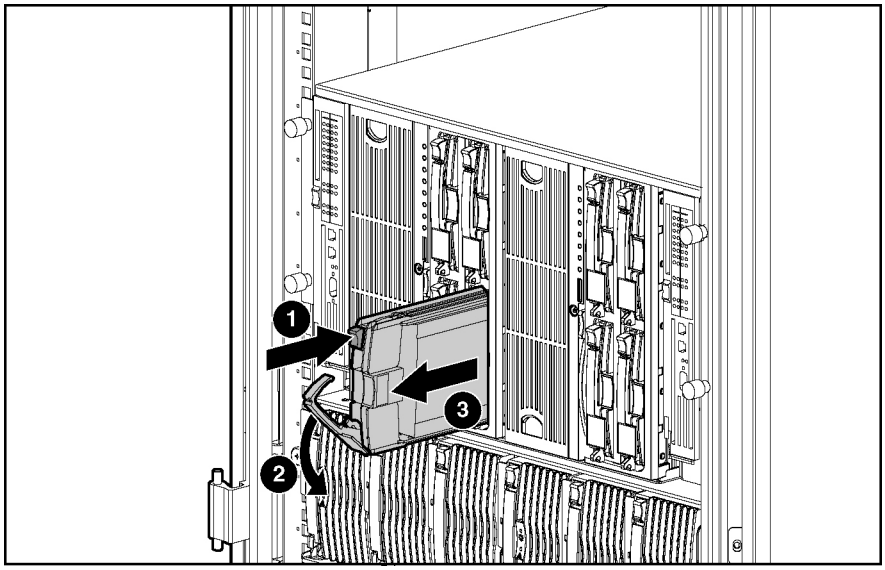

Figure 2-16: Removing a hot-plug SCSI hard drive

CAUTION: Always populate hard drive bays with either a hot-plug SCSI hard drive or hard drive blank. Operating the server blade without a hot-plug SCSI hard drive or hard drive blank results in improper airflow and improper cooling that can lead to thermal damage.

To replace a hot-plug SCSI hard drive:

1. Slide the drive into the cage until it is fully seated.
2. Close the lever, locking the drive into place.

DIMMs

To remove a DIMM:

1. Power down the server blade and remove it from the server blade enclosure. Refer to the "Server Blade Preparation" section in this chapter.
2. Remove the access panel. Refer to the "Access Panel" section in this chapter.

   NOTE: The server blade ships with at least two DIMMs installed in slots 1A and 2A.

3. Open the DIMM slot latches (1).
4. Remove the DIMM from the slot (2).

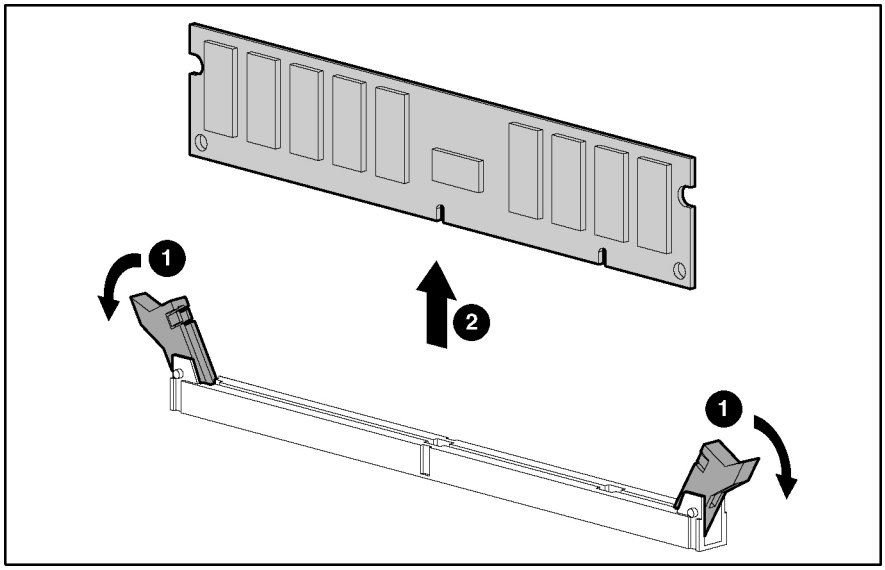

Figure 2-17: Removing a DIMM

CAUTION: For proper DIMM configuration, refer to the setup and installation guide.

CAUTION: Use only HP DIMMs. DIMMs from other sources may adversely affect data integrity.

IMPORTANT: Always install DIMMs in identical pairs.

IMPORTANT: DIMMs do not seat fully if turned the wrong way.

Reverse steps 1 through 4 to replace a DIMM.

Power Modules

The ProLiant BL40p server blade has two system board power modules and one PCI-X mezzanine power module. Refer to Figure 4-3 and Table 4-2 for locations. To remove a power module:

1. Power down the server blade and remove it from the server blade enclosure. Refer to the "Server Blade Preparation" section in this chapter.
2. Remove the access panel. Refer to the "Access Panel" section in this chapter.
3. Pull out the power module latches (1), and remove the power module from the slot (2).

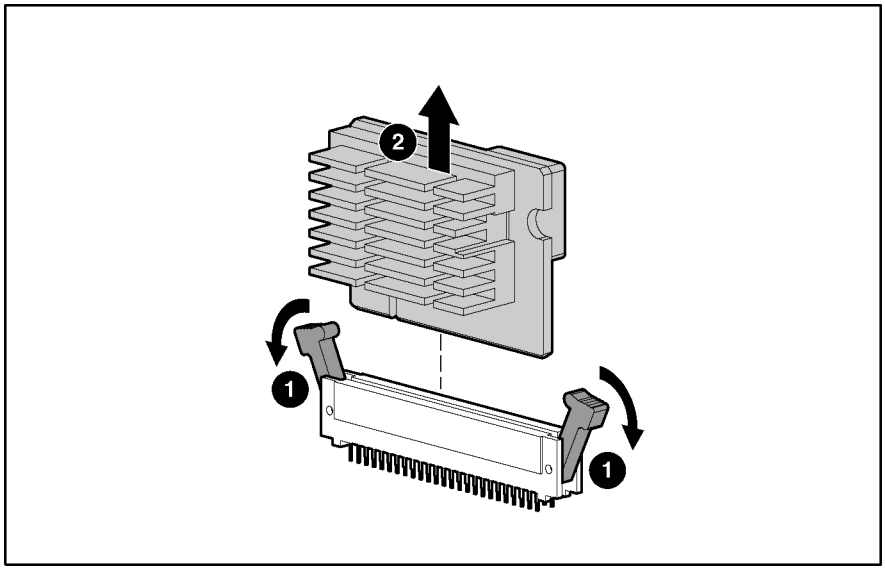

Figure 2-18: Removing a power module

Processors

The ProLiant BL40p server blade has the capability of up to four Xeon processors. To remove a processor:

1. Power down the server blade and remove it from the server blade enclosure. Refer to "Server Blade Preparation" in this chapter.
2. Remove the access panel and the system board tray assembly. Refer to "Server Blade Preparation" in this chapter.
3. Slide the processor baffle back and lift it off of the processor assemblies. Push the cables through the access holes in the processor baffle, but leave them attached to the system board as the processor baffle is removed.

CAUTION: To avoid damaging the system board, use caution when removing the processor baffle. The SCSI I2C cable and the SCSI backplane power cable must remain attached to the system board at this point.

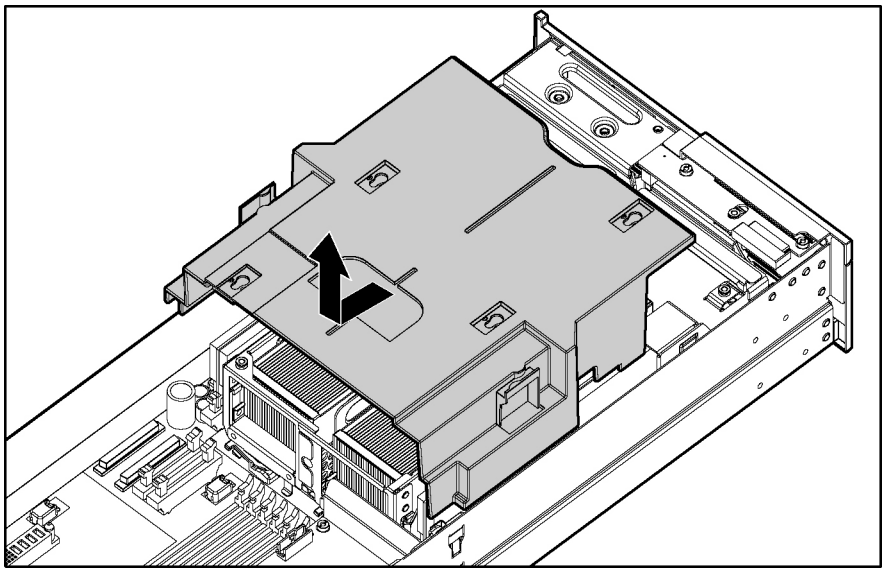

Figure 2-19: Removing the processor baffle

4. Lift the slate blue processor cage lever to release the processor cage (1).
5. Raise the processor cage away from the processor assembly (2).

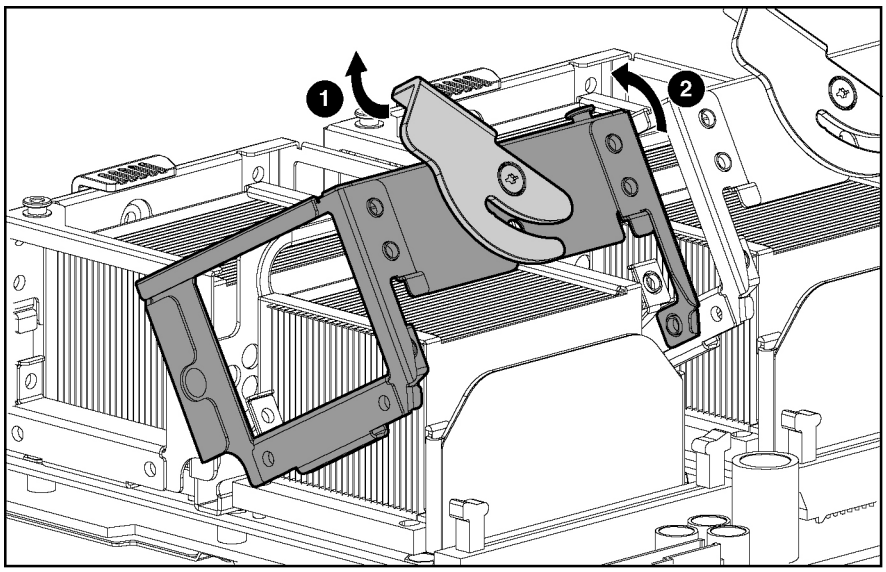

Figure 2-20: Removing the processor cage

6. Lift the processor-locking lever to release the processor assembly (1).
7. Lift the processor assembly away from the processor socket (2).

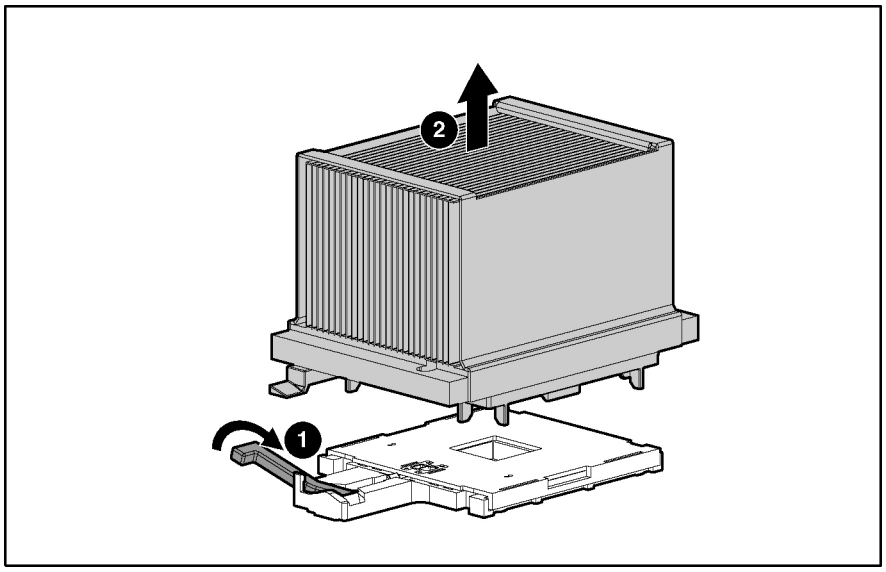

Figure 2-21: Removing the processor assembly

CAUTION: To avoid damage to the processors and processor sockets, be sure to:

- Completely open the processor-locking lever when installing a processor assembly.
- Completely close the processor-locking lever before lowering the processor cage.

To install the processor, reverse steps 1 through 7. Be sure to correctly align the pins when lowering the processor assembly onto the socket.

Processor Power Module

To remove a PPM:

1. Power down the server blade and remove it from the server blade enclosure. Refer to the "Server Blade Preparation" section in this chapter.
2. Remove the access panel and the system board tray assembly. Refer to the "Server Blade Preparation" section in this chapter.
3. Remove the processor baffle from the system board. Refer to the "Processors" section in this chapter.
4. Open the latches on the sides of the PPM slot (1).
5. Remove the PPM from the slot (2).

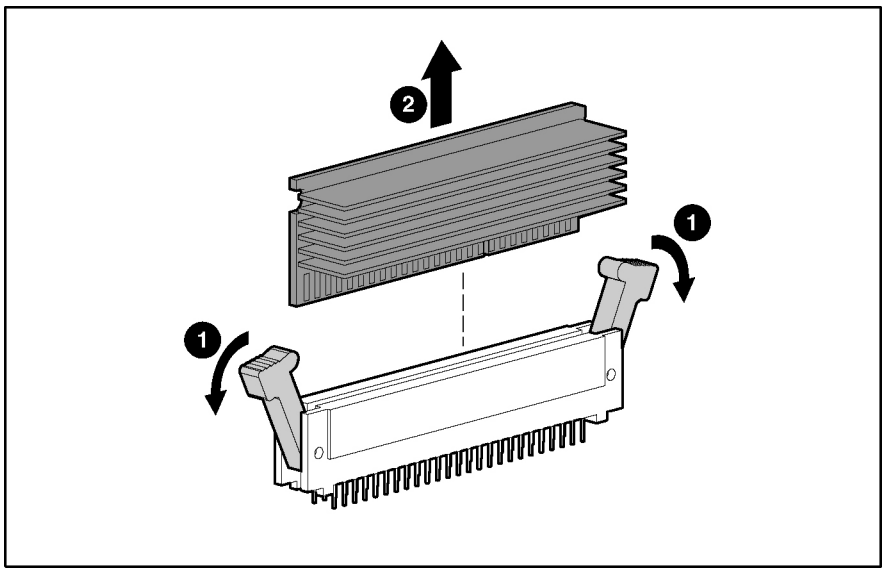

Figure 2-22: Removing a PPM

Reverse steps 1 through 5 to replace the PPM.

IMPORTANT: To remove PPMs for processors 2 and 3, pull the processor fan cage open to access the release levers. Refer to Figure 2-26 for instructions on how to open the processor fan cage.

DC Power Converter

Refer to the label on the DC power converter for removal instructions.

Smart Array 5i Plus Memory Module

To remove the Smart Array 5i Plus memory module:

1. Power down the server blade and remove it from the server blade enclosure. Refer to the "Server Blade Preparation" section in this chapter.
2. Remove the access panel. Refer to the "Access Panel" section in this chapter.
3. Remove the DC power converter from the system board. Refer to the label on the DC power converter.
4. Disconnect the Battery-Backed Write Cache Enabler cable, if the option is installed.

IMPORTANT: If the data in the Smart Array 5i Battery-Backed Write Cache Enabler needs to be saved, do not disconnect the battery module cable.

5. Pull out the levers on either side of the memory module (1).
6. Lift out the memory module at a 45° angle (2).

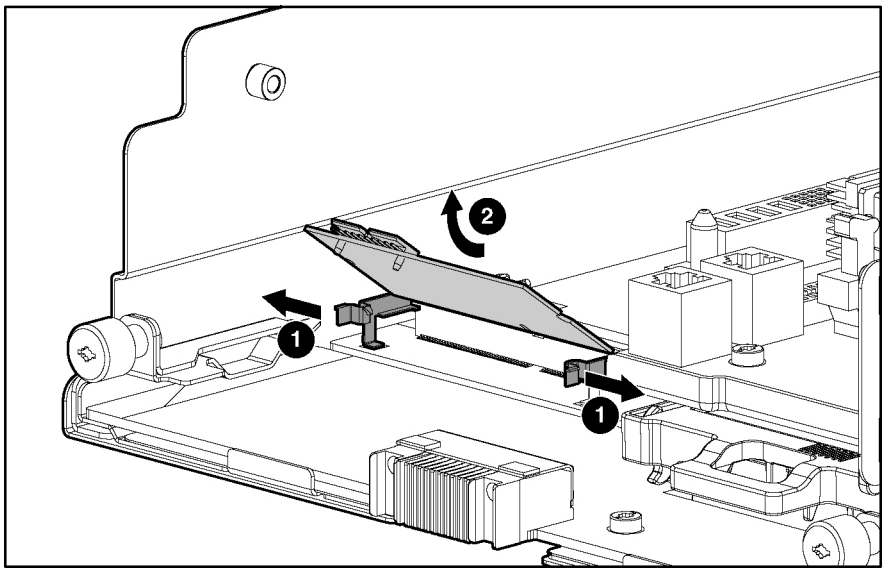

Figure 2-23: Removing the Smart Array Plus memory module

Reverse steps 1 through 6 to replace the Smart Array Plus memory module.

Battery-Backed Write Cache Enabler

To remove the Smart Array 5i Battery-Backed Write Cache Enabler:

1. Power down the server blade and remove it from the server blade enclosure. Refer to the "Server Blade Preparation" section in this chapter.
2. Remove the access panel. Refer to the "Access Panel" section in this chapter.
3. Remove the DC power converter from the system board. Refer to the label on the DC power converter.
4. Disconnect the battery module cable from the Smart Array 5i Plus memory module.

IMPORTANT: If the data in the Smart Array 5i Battery-Backed Write Cache Enabler needs to be saved, do not disconnect the battery module cable.

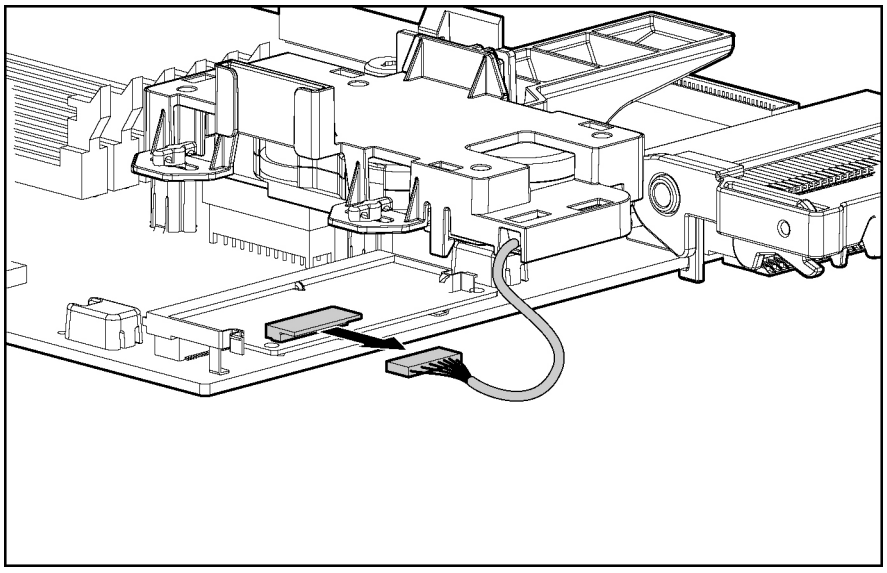

Figure 2-24: Disconnecting the Battery-Backed Write Cache Enabler

5. Turn the standoffs to release the Battery-Backed Write Cache Enabler (1), and lift it off of the system board (2).

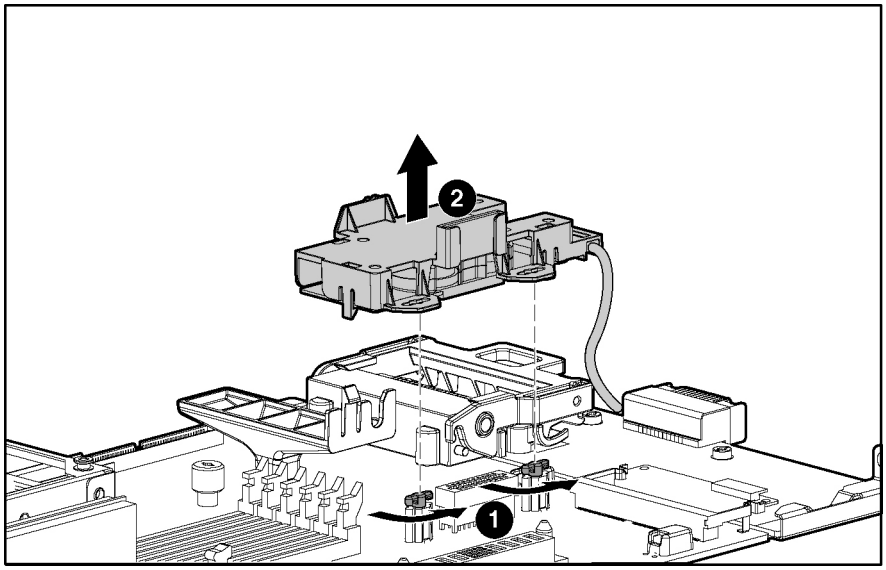

Figure 2-25: Removing the Battery-Backed Write Cache Enabler

Reverse steps 1 through 5 to replace the Battery-Backed Write Cache Enabler.

Processor Fan Assembly

To remove the processor fan assembly:

1. Power down the server blade and remove it from the server blade enclosure. Refer to the "Server Blade Preparation" section in this chapter.
2. Remove the access panel. Refer to the "Access Panel" section in this chapter.
3. Remove the system board tray assembly. Refer to the "Removing the System Board Tray Assembly" section in this chapter.
4. Disconnect the fan cable from the system board. Refer to Figure 4-3 to identify the fan cable connector.
5. Press the release levers on the front of the fan assembly (1), and slide the tray to the open position (2).

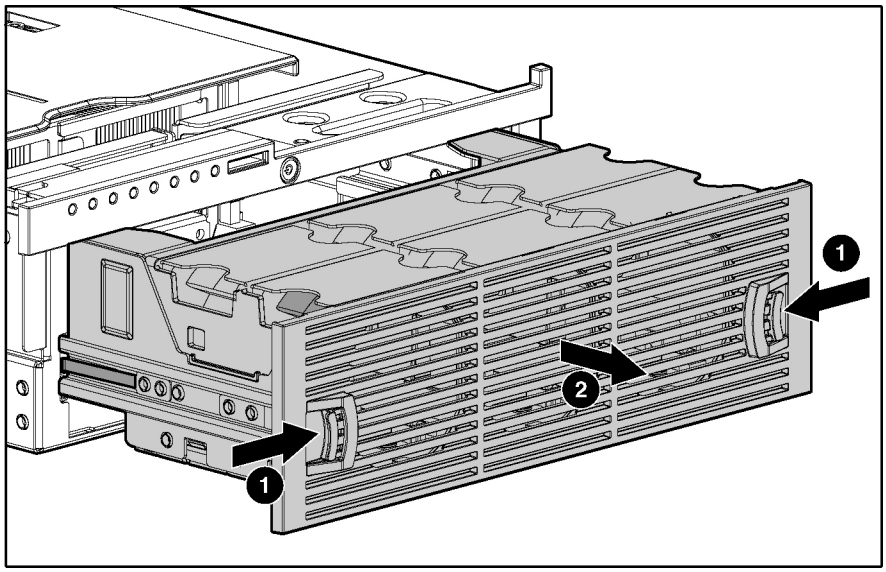

Figure 2-26: Disconnecting the processor fan assembly

6. Press in the spring locks on either side of the fan assembly (1), and slide the fan assembly out (2).
7. To remove an individual fan, squeeze the port-colored levers on either side of the fan (3), and lift the fan out (4).

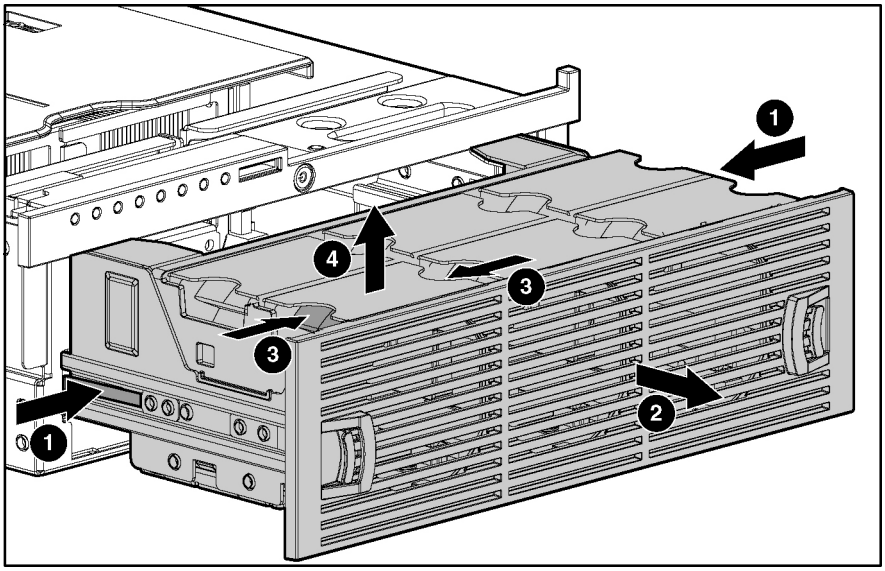

Figure 2-27: Removing the processor fan assembly

Reverse steps 1 through 6 to replace the processor fan assembly.

Ethernet Passthrough Board

To remove the Ethernet passthrough board:

1. Power down the server blade and remove it from the server blade enclosure. Refer to the "Server Blade Preparation" section in this chapter.
2. Remove the access panel. Refer to the "Access Panel" section in this chapter.
3. Disconnect RJ-45 cables from either the PCI-X mezzanine board or the Ethernet passthrough board.
4. Turn the thumbscrew to release the Ethernet passthrough board (1) and pull the board out of the chassis (2).

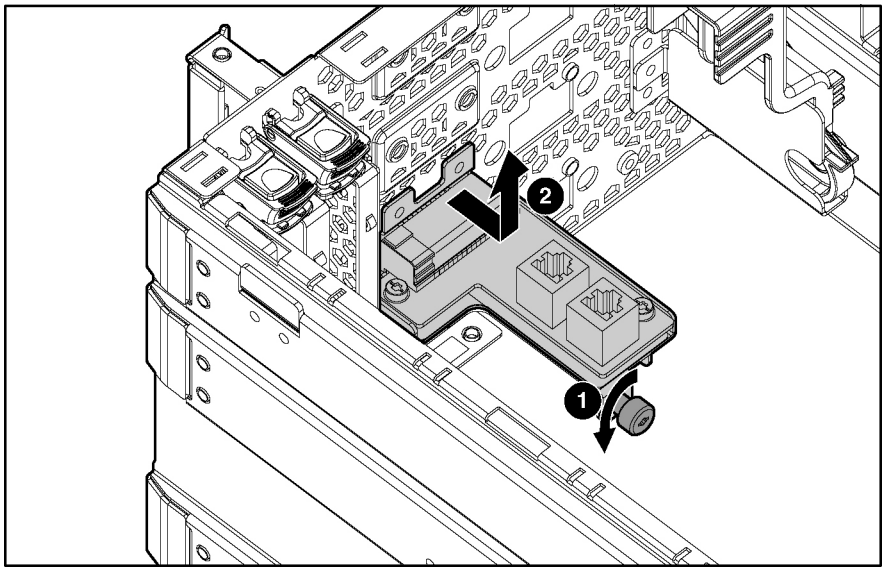

Figure 2-28: Removing the Ethernet passthrough board

Reverse steps 1 through 4 to replace the Ethernet passthrough board.

PCI-X Mezzanine Board

To remove the PCI-X mezzanine board:

1. Power down the server blade and remove it from the server blade enclosure. Refer to "Server Blade Preparation" in this chapter.
2. Remove the access panel and the system board tray assembly. Refer to "Server Blade Preparation" in this chapter.
3. Disconnect RJ-45 cables from the PCI-X mezzanine board.
4. Remove any host-bus adapter cards installed in the PCI-X mezzanine board. Refer to "Host-Bus Adapter Cards" in this chapter.
5. Simultaneously raise the two slate blue release levers to a 90° angle (1).
6. Lift the PCI-X mezzanine board off of the system board (2).

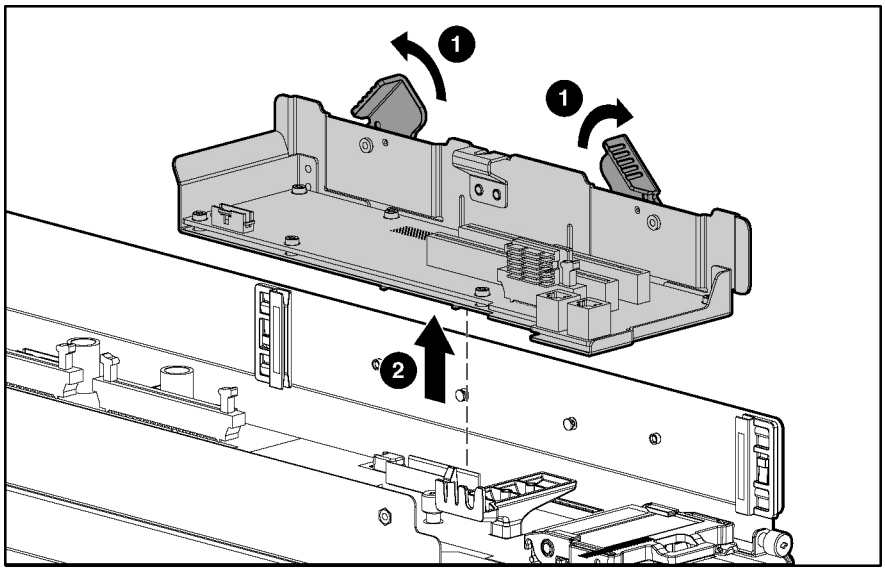

Figure 2-29: Removing the PCI-X mezzanine board

Reverse steps 1 through 6 to replace the PCI-X mezzanine board.

NIC I/O Board

To remove the NIC I/O board:

1. Power down the server blade and remove it from the server blade enclosure. Refer to the "Server Blade Preparation" section in this chapter.
2. Remove the access panel and the system board tray assembly. Refer to the "Server Blade Preparation" section in this chapter.
3. Remove the PCI-X mezzanine board. Refer to the "PCI-X Mezzanine Board" section in this chapter.
4. Turn the two slate blue thumbscrews on either side of the NIC I/O board to loosen it from the system board (1).
5. Lift the slate blue release handle to a 45° angle to disengage the NIC I/O board (2) and pull it away from the system board (3).

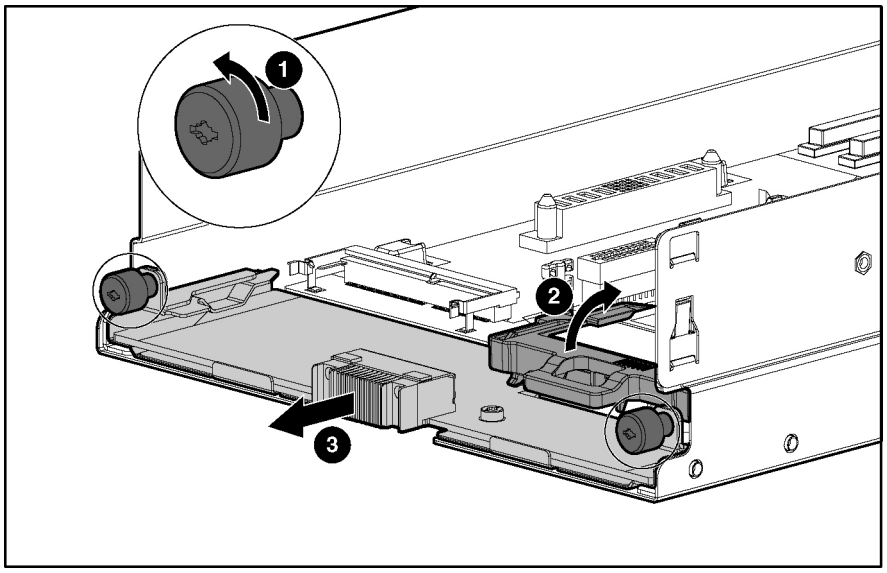

Figure 2-30: Removing the NIC I/O board

Reverse steps 1 through 5 to replace the NIC I/O board.

CAUTION: To avoid damaging the NIC I/O board pins, be sure to use use caution when aligning it back into the system board.

SCSI Backplane

To remove the SCSI backplane:

1. Power down the server blade and remove it from the server blade enclosure. Refer to the "Server Blade Preparation" section in this chapter.
2. Remove the access panel. Refer to the "Access Panel" section in this chapter.
3. Remove any hot-plug SCSI hard drives or hard drive blanks:
   - If any hard drive blanks are installed, refer to the "Hard Drive Blanks" section in this chapter.
   - If any hot-plug SCSI hard drives are installed, refer to the "Hot-Plug SCSI Hard Drives" section in this chapter.
4. Remove the three-fan assembly. Refer to the "Server Blade Preparation" section in this chapter.
5. Open the chassis doors on either side of the SCSI backplane to provide adequate room for SCSI backplane removal:
   a. Pull the slate blue locking pin out (1) and turn a quarter turn to lock in the open position (2).
   b. Slide doors towards the back of the chassis (3).
6. Disconnect any cables from the SCSI backplane board (4).

IMPORTANT: If the SCSI I2C cable or the SCSI backplane power cable remain attached to the SCSI backplane board when it is removed, damage may occur to the system board. All cables must be disconnected from the SCSI backplane board before removing it.

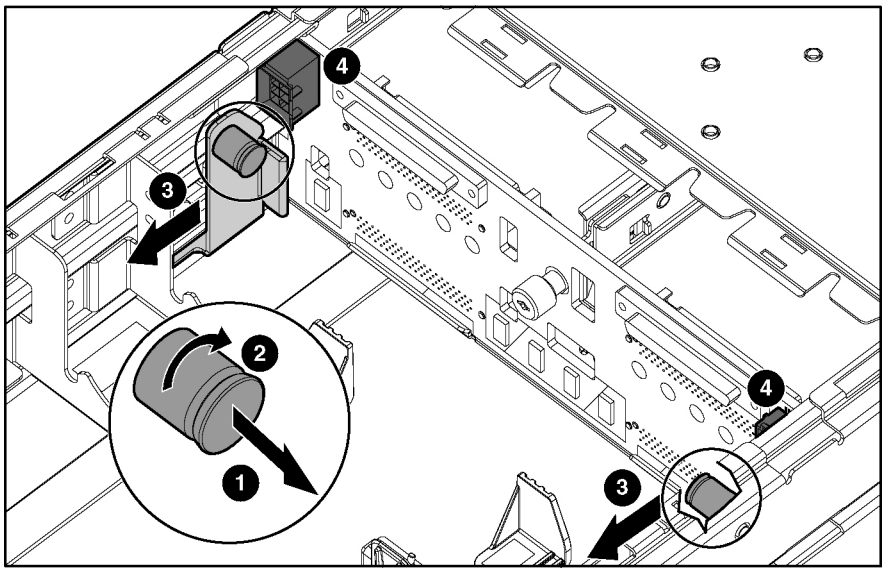

Figure 2-31: Opening the SCSI backplane doors

7. Turn the thumbscrew to release the SCSI backplane (1) and lift out (2).

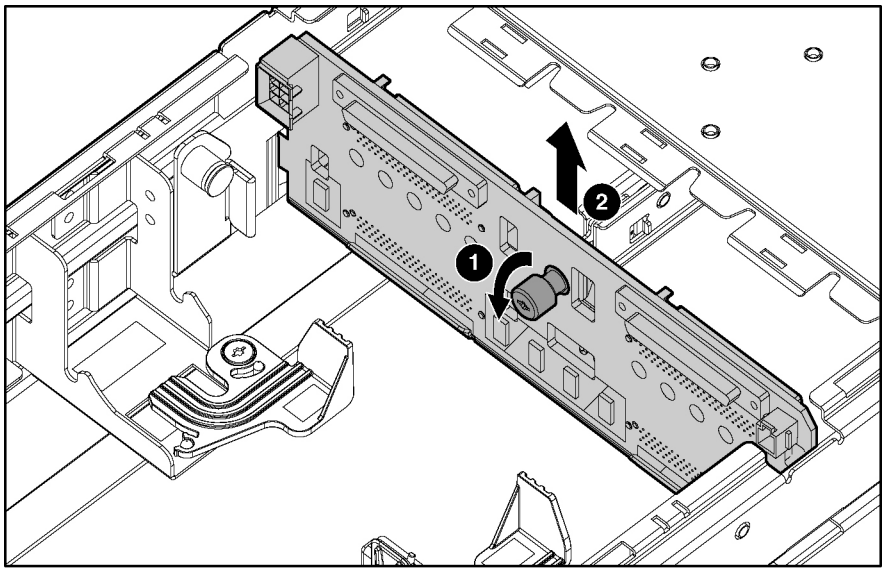

Figure 2-32: Removing the SCSI backplane

Reverse steps 1 through 7 to replace the SCSI backplane.

Power Button/LED Board

To remove the power button/LED board:

1. Power down the server blade and remove it from the server blade enclosure. Refer to the "Server Blade Preparation" section in this chapter.
2. Remove the access panel and the system board tray assembly. Refer to the "Server Blade Preparation" section in this chapter.
3. Use a Torx-15 screwdriver to remove the two retaining screws from the power button/LED board (1).
4. Lift the power button/LED board off the chassis (2).

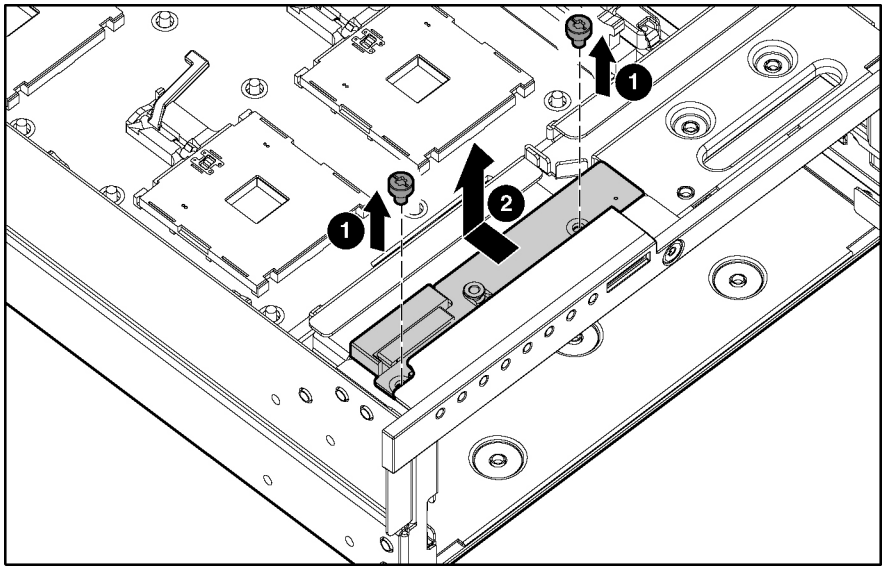

Figure 2-33: Removing the power button/LED board

Reverse steps 1 through 4 to replace the power button/LED board.

Battery

If the server blade no longer automatically displays the correct date and time, you may need to replace the battery that provides power to the real-time clock. Under normal use, battery life is 5 to 10 years.

WARNING: This server blade contains either an internal lithium manganese dioxide or a vanadium pentoxide battery. A risk of fire and burns exists if the battery pack is not handled properly. To reduce the risk of personal injury:

- **Do not attempt to recharge the battery.**
- **Do not expose to temperatures higher than 60°C (140° F).**
- **Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.**
- **Replace only with the spare designated for this product.**

CAUTION: Loss of BIOS settings will occur if the lithium battery is removed. BIOS settings must be reconfigured whenever the battery is replaced.

CAUTION: Batteries, battery packs, and accumulators should not be disposed of along with general household waste. In order to forward them for recycling or proper disposal, please use the public collection system or return them to the authorized partners or their agents.

IMPORTANT: Run the System Utility to configure the system after replacing the battery. Refer to the *HP ProLiant BL p-Class System Setup and Installation Guide* for more information.

To remove the system board battery:

1. Power down the server blade and remove it from the server blade enclosure. Refer to the "Server Blade Preparation" section in this chapter.
2. Remove the access panel. Refer to the "Access Panel" section in this chapter.
3. Locate the battery holder on the system board.

4. Insert a pen or other narrow object into the slot at the front of the battery holder to release the battery (1).
5. Lift the battery away from the battery holder (2).

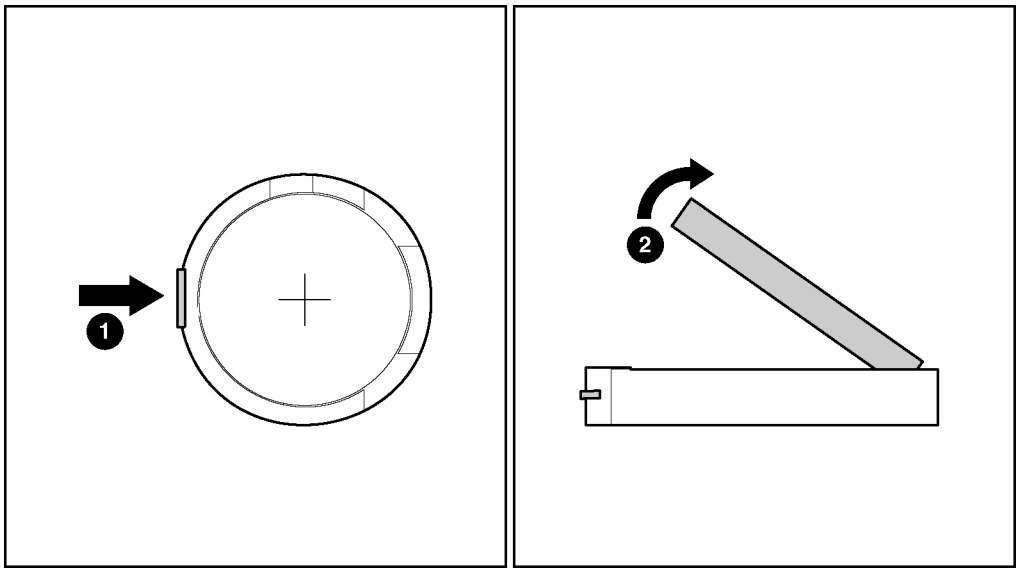

Figure 2-34: Removing the battery from the system board

Reverse steps 1 through 5 to replace the system board battery.

System Board

To remove the system board:

1. Power down the server blade and remove it from the server blade enclosure. Refer to the "Server Blade Preparation" section in this chapter.
2. Remove the access panel and the system board tray assembly. Refer to the "Server Blade Preparation" section in this chapter.
3. Remove the DIMMs. Refer to the "DIMMs" section in this chapter.
4. Remove the PPMs. Refer to the "Processor Power Module" section in this chapter.
5. Remove the processor assemblies. Refer to the "Processors" section in this chapter.
6. Pull the processor fan assembly into the open position using the buttons on the front of the assembly. Refer to the "Processor Fan Assembly" section in this chapter.
7. Remove the Battery-Backed Write Cache Enabler, if the option is installed. Refer to the "Battery-Backed Write Cache Enabler" section in this chapter.
8. Remove the Smart Array Plus memory module. Refer to the "DC Power Converter" section in this chapter.
9. Remove the NIC I/O board. Refer to the "NIC I/O Board" section in this chapter.
10. Remove all cables connected to the system board.
11. Loosen the system board thumbscrew.

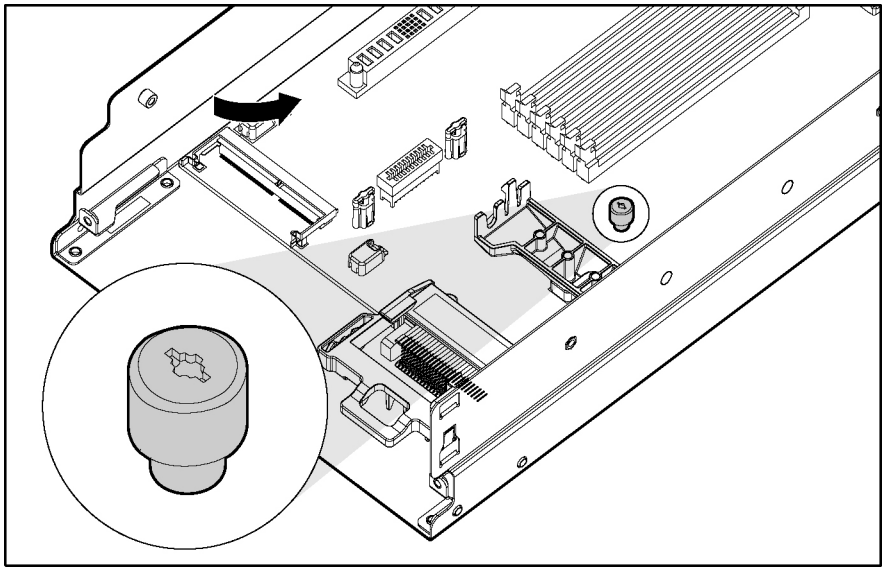

Figure 2-35: Loosening the system board thumbscrew

12. Slide the system board toward the front of the server blade (1). Be sure that the board unseats from the alignment keys.
13. Using the handles on the processor cages and the PCI-X support handle, lift the system board out of the chassis (2).

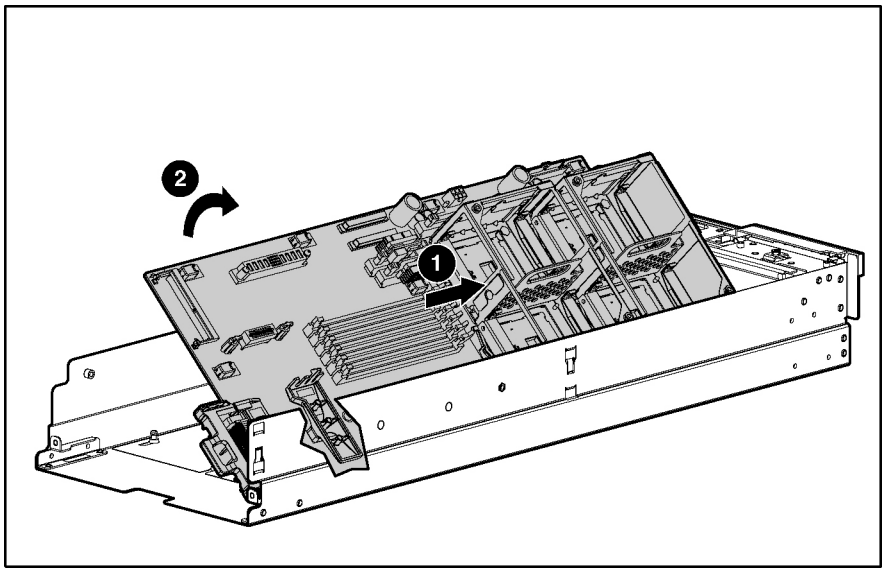

Figure 2-36: Disengaging the system board

Reverse steps 1 through 13 to replace the system board.

Server Blade Blanks

To remove a server blade blank:

1. Press the release buttons simultaneously (1).
2. Slide the server blade blank from the server blade enclosure (2).

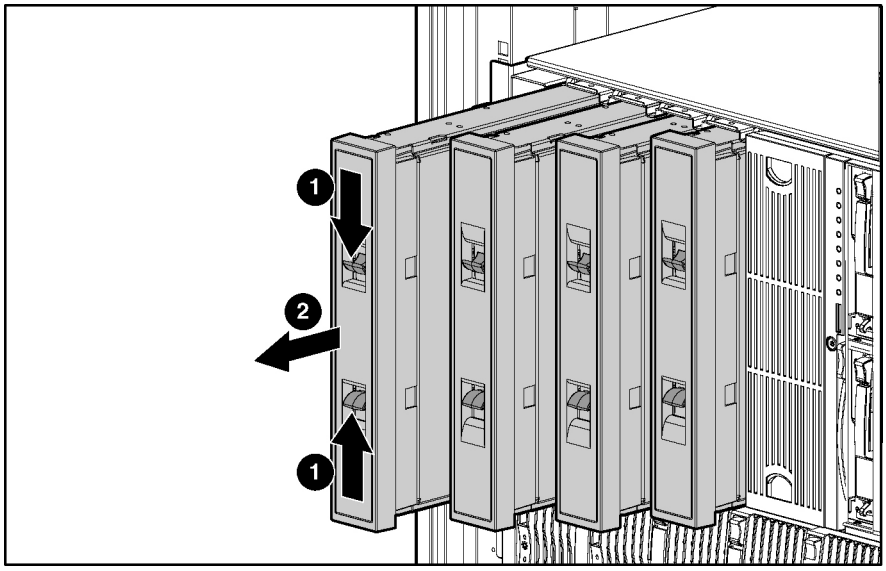

Figure 2-37: Removing a server blade blank

CAUTION: Always populate server blade enclosure bays with either a server blade or server blade blank. Operating the server blade enclosure without a server blade or server blade blank results in improper airflow and improper cooling that can lead to thermal damage.

To replace a server blade blank, align the blank with the empty bay and slide it in until the blank is fully seated.

3

Diagnostic Tools

This chapter is an overview of software and firmware diagnostic tools that are available for configuring, monitoring, and managing the system. Refer to the *HP ProLiant BL40p Server Blade Setup and Installation Guide* on the Documentation CD, or to

www.hp.com

ProLiant BL p-Class Diagnostic Tools

Use the following tools to diagnose problems, test hardware, and monitor and manage system operations.

Table 3-1: Diagnostic Tools

Tool	Description	How to run the tool
Array Diagnostics Utility (ADU)	ADU is designed to run on all HP systems that support HP array controllers. ADU collects information about the array controllers in the system and generates a list of detected problems.	For a list of HP systems that support ADU, visit the HP website: www.compaq.com/support/files For a complete list of ADU error messages, refer to the *HP Servers Troubleshooting Guide*.
Automatic Server Recovery-2 (ASR-2)	ASR-2 automatically restarts the server blade after a catastrophic operating system failure. With ASR-2, you have multiple recovery options: • Available Recovery provides software error recovery and environmental recovery. • Unattended Recovery logs the error information to the IML, resets the server blade, and tries to restart the operating system.	Run RBSU and set ASR-2 to enable this tool.
HP Diagnostics	HP Diagnostics tests and verifies operation of HP hardware. If HP Diagnostics finds a hardware failure, it isolates the replaceable part, if possible.	Access HP Diagnostics when POST detects a system configuration error. For a complete list of POST error messages, refer to the *HP Servers Troubleshooting Guide*. HP Diagnostics can be downloaded from the HP website: www.compaq.com/support/files
Insight Manager 7	Insight Manager 7 is a client/server application used to remotely manage HP hardware in a network environment. Insight Manager reports hardware fault conditions (both failure and pre-failure) and collects data for reporting and graphing.	For more information on viewing and printing the event list, refer to the *Insight Manager User Guide* or the setup and installation guide.
ROMPaq Utility	The ROMPaq Utility checks the system and provides a choice of available ROM revisions and controller firmware.	You can download this utility from the HP website: www.hp.com

continued

Table 3-1: Diagnostic Tools *continued*

Tool	Description	How to run the tool
Survey Utility	The Survey Utility gathers critical hardware and software information on server blades. If a significant change occurs between data-gathering intervals, the Survey Utility marks the previous information and overwrites the survey text files to reflect the latest changes in the configuration.	The Survey Utility is available on the ProLiant Essential Rapid Deployment Pack CD or on the HP website: www.compaq.com/support/files/servers/us/index.html
Integrated Lights-Out ROM-Based Setup Utility (iLO RBSU)	The iLO RBSU is the recommended method to configure and set up the iLO. The iLO RBSU is designed to assist you with setting up an iLO on a network; it is not intended for continued administration.	Run iLO RBSU by pressing the **F8** key during POST.
Integrated Management Log (IML)	The IML is a log of system events such as system failures or nonfatal error conditions. View events in the IML from within: • Insight Manager 7 • Survey Utility • Operating system-specific IML utilities	The IML requires HP operating system management drivers. Refer to the ProLiant Essentials Rapid Deployment Pack CD for instructions on installing the appropriate drivers.
Option ROM Configuration for Arrays (ORCA)	The Option ROM Configuration for Arrays utility is a menu-driven utility that does not require a CD and can be started when the server blade is booting. This utility enables users to perform the following functions: • Create, configure, and/or delete logical drives. • Specify RAID levels. • Assign online spares. • Set interrupts and the boot controller order.	Run ORCA by pressing the **F8** key during POST.
ProLiant Essentials Rapid Deployment Pack	The optional ProLiant Essentials Rapid Deployment Pack is the preferred method for rapid, high-volume server blade deployments. The Rapid Deployment Pack includes Altiris eXpress Deployment Server and the SmartStart Scripting Toolkit.	Install the CD in the CD-ROM drive of the administrator workstation or client PC and refer to the documentation that ships with the software.
Embedded Server Setup (ESS)	The Diagnostics Utility, which checks the validity of three server blade subsystems needed to boot an OS, is enabled through the ESS System Maintenance menu. It includes the Memory Test, CPU Test, and Boot Disk Test. The Inspect Utility, which allows you to view system configuration information, is also enabled through ESS.	Run ESS by pressing the **F10** key during POST.
Syslog file	The syslog file implies a Linux OS and records server blade activity.	View the syslog file through /var/log messages

continued

Table 3-1: Diagnostic Tools *continued*

Tool	Description	How to run the tool
Nteventlog file	The nteventlog file implies a Microsoft® Windows® OS and records server blade activity.	View the nteventlog file through the Windows Event Viewer.
ROM-Based Setup Utility (RBSU)	RBSU configures the hardware installed in the server blade. This utility enables users to: • Store configuration information in nonvolatile memory. • Manage memory installation, processor upgrades, network interface cards, and mass storage devices. • Assist in installing an operating system. • Configure ports and IRQs, if required.	Run RBSU by pressing the **F9** key during POST.

Firmware Upgrades for Management Modules

For information about upgrading server blade management module or power management module firmware, refer to the HP website:

www.hp.com

4

Connectors, LEDs, and Switches

This chapter explains the location and function of system connectors, internal and external LEDs, and switches.

Connectors

Use the following sections to identify connectors on the ProLiant BL40p server blade.

Front Panel Connectors

The server blade has one front panel connector, a diagnostic port that accepts the diagnostic cable for configuration and troubleshooting purposes.

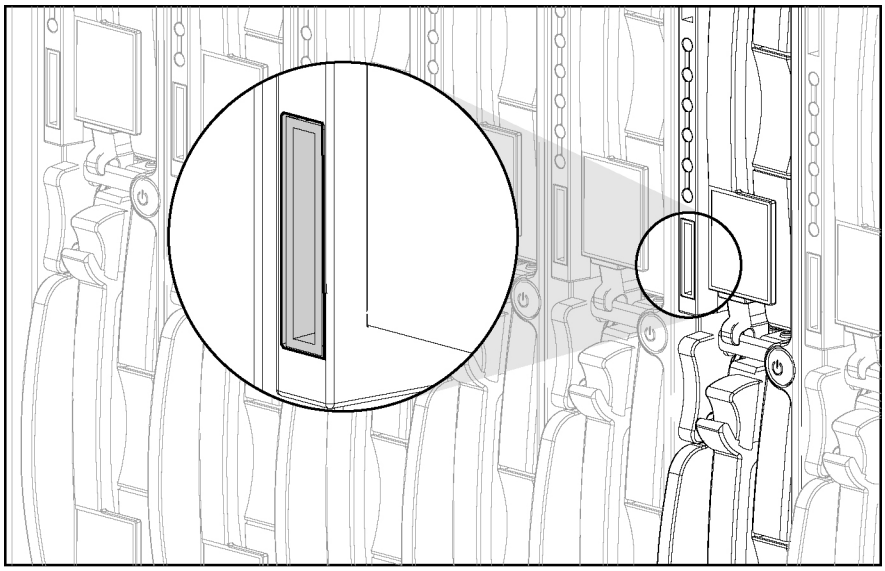

Figure 4-1: ProLiant BL40p diagnostic port

Rear Panel Connectors

Use Figure 4-2 and Table 4-1 to identify ProLiant BL40p server blade rear panel connectors.

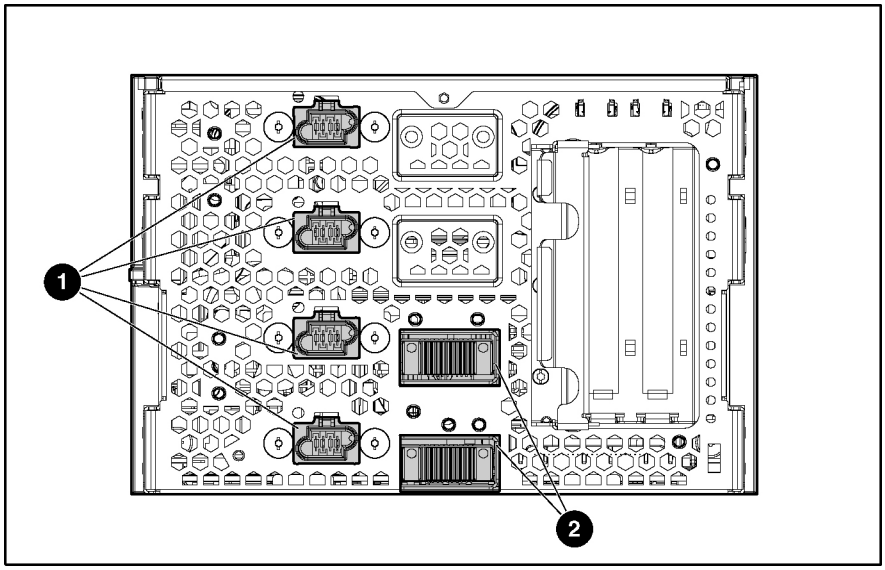

Figure 4-2: ProLiant BL40p server blade rear panel connectors

Table 4-1: ProLiant BL40p Server Blade Rear Panel Connectors

Item	Description
1	Power connectors
2	Signal connectors

System Components and Connectors

Use Figure 4-3 and Table 4-2 to identify ProLiant BL40p system components and connectors.

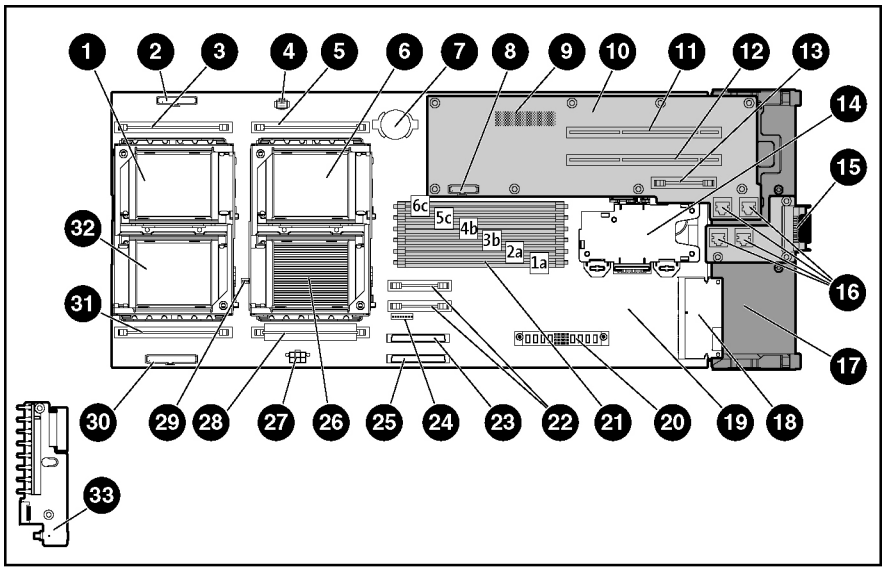

Figure 4-3: ProLiant BL40p system components and connectors

Table 4-2: System Components and Connectors

Item	Component	Item	Component
1	Processor socket 3	18	Smart Array 5i Plus memory module
2	LED/power switch board connector	19	System board
3	PPM slot 3	20	DC power converter connector
4	SCSI I2C cable connector	21	DIMM slots (6)
5	PPM slot 4	22	System board power modules (2)*
6	Processor socket 4	23	Channel B SCSI connector
7	System battery	24	System maintenance switch (SW3)
8	SCSI fan power connector	25	Channel A SCSI connector
9	PCI-X mezzanine board connector	26	Processor 1
10	PCI-X mezzanine board	27	SCSI power connector
11	64-bit/100 MHz PCI-X slot 2	28	PPM 1
12	64-bit/100 MHz PCI-X slot 1	29	System ID switch (SW1)
13	PCI-X mezzanine power module*	30	Processor fan connector
14	Battery-Backed Write Cache Enabler	31	PPM slot 2
15	Ethernet passthrough board (connects to chassis)	32	Processor socket 2
16	RJ-45 connectors	33	LED/power switch board
17	NIC I/O board		

* same component

LEDs

Use the following section to identify LEDs on the following ProLiant BL p-Class system components:

- ProLiant BL40p server blade front panel
- Hot-plug SCSI hard drives

ProLiant BL40p Server Blade Front Panel

Six LEDs on the front of the server blade indicate server status. Use Figure 4-4 and Table 4-3 to identify LED locations and functions.

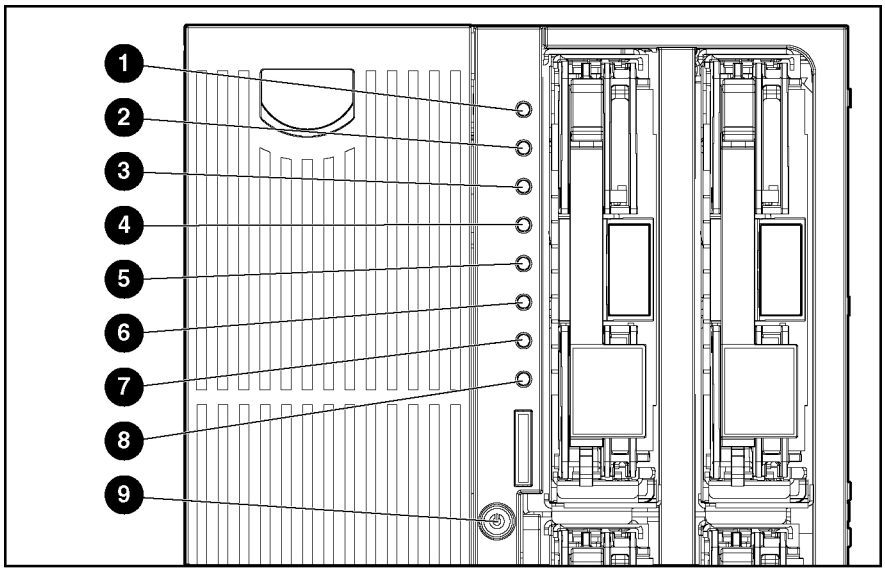

Figure 4-4: ProLiant BL40p server blade front panel LEDs

Table 4-3: ProLiant BL40p Server Blade Front Panel LEDs

Item	LED Description	Status
1	Unit identification	Blue = Flagged Blue flashing = Management mode Off = No remote management
2	Internal health	Green = Normal (when server blade is powered on) Off = Normal (when server blade is on standby) Amber = System degraded Red = System critical

continued

Table 4-3: ProLiant BL40p Server Blade Front Panel LEDs *continued*

Item	LED Description	Status
3	External health	Green = Normal (when server blade is powered on) Off = Normal (when server blade is on standby) Amber = Redundant fan failed Red = Critical fan failure
4	NIC 1	Green = Linked to network Green flashing = Network activity Off = No activity
5	NIC 2	
6	NIC 3	
7	NIC 4	
8	NIC 5	
9	Power On/Standby	Green = On Amber = Standby (power available) Off = Unit off

Hot-Plug SCSI Hard Drives

Each hot-plug SCSI hard drive has three LED indicators located on the front of the drive. The LEDs provide activity, online, and fault status for each corresponding drive when configured as a part of an array and attached to a powered-on Smart Array controller. Their behavior may vary depending on the status of other drives in the array. Use Figure 4-5 and Table 4-4 to identify LED locations and functions.

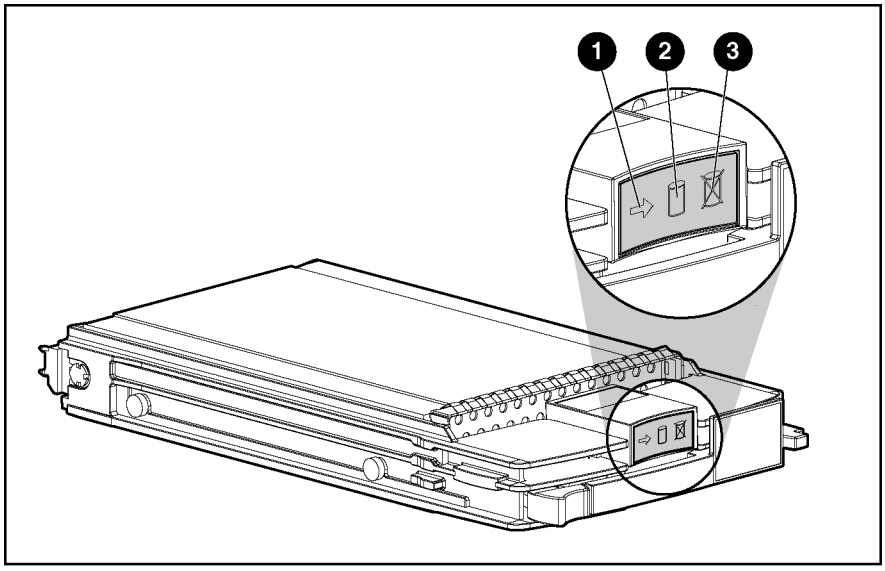

Figure 4-5: Hot-plug SCSI hard drive LEDs

Table 4-4: Hot-Plug SCSI Hard Drive LEDs

1 Activity	2 Online	3 Fault	Means
On	Off	Off	**Do not remove the drive. Removing a drive during this process causes data loss.** The drive is being accessed and is not configured as part of an array.
On	Flashing	Off	**Do not remove the drive. Removing a drive during this process causes data loss.** The drive is rebuilding or undergoing capacity expansion.
Flashing	Flashing	Flashing	**Do not remove the drive. Removing a drive during this process causes data loss.** The drive is part of an array being selected by the Array Configuration Utility. -Or- The Options ROMPaq is upgrading the drive.
Off	Off	Off	OK to replace the drive online if a predictive failure alert is received and the drive is attached to an array controller. The drive is not configured as part of an array. -Or- If this drive is part of an array, a powered-on controller is not accessing the drive. -Or- The drive is configured as an online spare.
Off	Off	On	OK to replace the drive online. The drive has failed and has been placed offline.
Off	On	Off	OK to replace the drive online if a predictive failure alert is received, provided that the array is configured for fault tolerance, and all other drives in the array are online. The drive is online and configured as part of an array.
On or flashing	On	Off	OK to replace the drive online if a predictive failure alert is received, provided that the array is configured for fault tolerance, and all other drives in the array are online. The drive is online and being accessed.

Switches

Use the following sections to identify the locations and functions of push-button and system switches.

System Switches

System switches enable you to change certain settings or to perform advanced diagnostic procedures. The following sections explain the functions of each switch. Use Figure 4-6 and Table 4-5 to identify switch locations and functions.

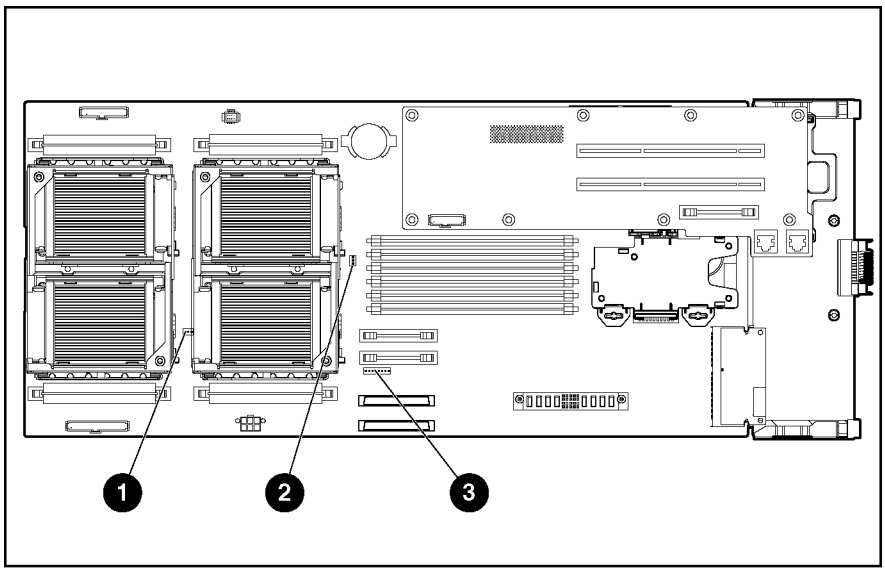

Figure 4-6: Server blade system switches

Table 4-5: Server Blade System Switches

Item	Description
1	System ID switch (SW1)
2	NMI switch
3	System maintenance switch (SW3)

System ID Switch (SW1)

The system ID switch is a three-position switch used for chassis ID. Settings should be changed only by an authorized service provider. Refer to Table 4-6 for system ID switch settings.

Table 4-6: System ID Switch (SW1) Settings

Position	Description	On/Off Function
1	Chassis ID0	All pins will be set to off. HP does not recommend changing this switch setting.
2	Chassis ID1	
3	Chassis ID2	

System Maintenance Switch (SW3)

The system maintenance switch is an eight-position switch that implements protection and override functions. The default setting for all 8 positions is off. For the proper system maintenance switch settings, refer to Table 4-7 or to the labels attached to the inside of the server blade access panel.

Table 4-7: System Maintenance Switch (SW3) Settings

Position	Description	On/Off Function
1	iLO Security Override	Off = iLO Security is enabled. On = Overrides iLO security function.
2	Configuration lock	Off = System configuration can be modified. On = System configuration is locked and cannot be modified.
3	iLO Power Button Override	Off = System power button is controlled through iLO. Rack power availability is checked before system can power on. On = System power button turns on the system, regardless of power availability.
4	Enable Diskette Boot	Off = Diskette boot is controlled by configuration. On = Override diskette boot.
5	Password Disable	Off = Power-on password is normal. On = Power-on password is disabled.
6	Invalidate Configuration	Off = Normal. On = ROM treats the system configuration as invalid.
7	Interlock Disable	Off = Normal. On = Disable interlock.
8	Hot Spare Boot Disable	Off = Hot spare boot is enabled. On = Hot spare boot functionality is disabled.

5

Port 84 Codes

Determining Port 84 Codes

A combination of port 84 LEDs is translated into a hexadecimal code, which can be used for troubleshooting. This chapter describes how to determine the port 84 code, and what the codes mean. Refer to Figure 5-1 for the location of the port 84 LEDs. The port 84 LEDs can be viewed using one of these methods:

- With the server blade in the enclosure, log into iLO to view the port 84 codes.
- Use the diagnostic station to power up the server blade outside the rack, and remove the access panel to view the port 84 LEDs. Refer to the *HP ProLiant BL p-Class System Diagnostic Station User Guide* for instructions.

IMPORTANT: iLO port 84 codes may differ from port 84 LED codes. Table 5-4 defines port 84 codes for the system board port 84 LEDs only.

WARNING: Only qualified service personnel should power up the server blade with the access panel removed. To reduce the risk of injury from electric shock or hazardous energy when working on the server:

- Remove all watches, rings, and any other loose-fitting jewelry.
- Avoid the risk of conductive tools inside the server that could bridge live parts.

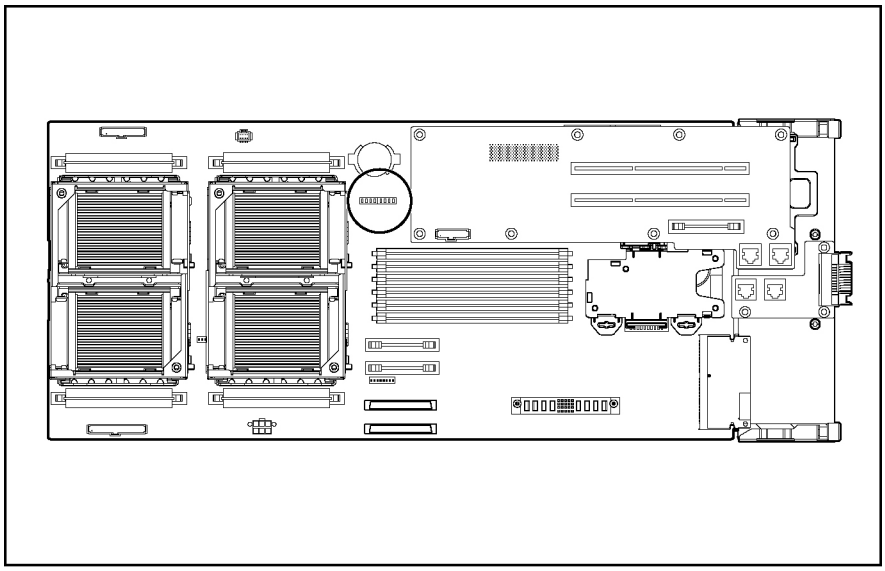

Figure 5-1: Port 84 location on the system board

The port 84 LEDs consist of two groups of four LEDs. Each group of four LEDs represents one character of the code. Figure 5-2 and Table 5-1 explain the components of the port 84 LEDs.

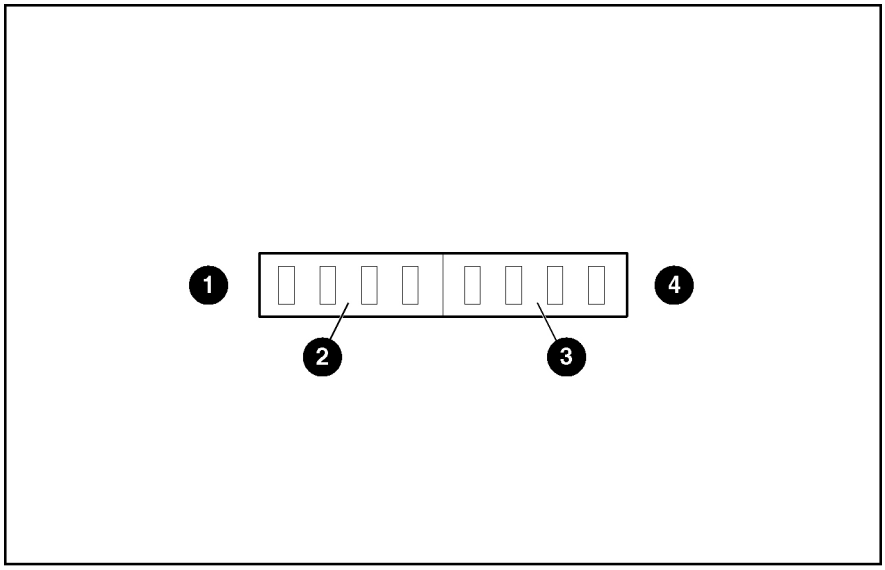

Figure 5-2: Port 84 LEDs

Table 5-1: Port 84 LEDs

Item	Description
1	Front of the server blade*
2	First code character (Most Significant Bit)
3	Second code character (Least Significant Bit)
4	Rear of server blade*

***** When reading the port 84 LEDs, you must be oriented to the server blade properly. The rear of the server blade should be at the right; the front should be at the left.

When determining the port 84 code:

- A green LED indicates 1.
- An off LED indicates 0.

Therefore, each LED will be assigned either 0 or 1.

Moving from left to right, the series of numbers assigned to the first four LEDs is translated into a code, which consists of any characters 0 through 9 or A through F. The series of numbers assigned to the next four LEDs is translated into the same code, resulting in a final two-character code. Refer to Table 5-2 to determine how to read the code from the LED pattern.

Table 5-2: Port 84 Code Translations

LED pattern	Character
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	A
1011	B
1100	C
1101	D
1110	E
1111	F

Refer to Figure 5-3 and Table 5-3 for a sample LED reading and the corresponding code determined from that LED reading.

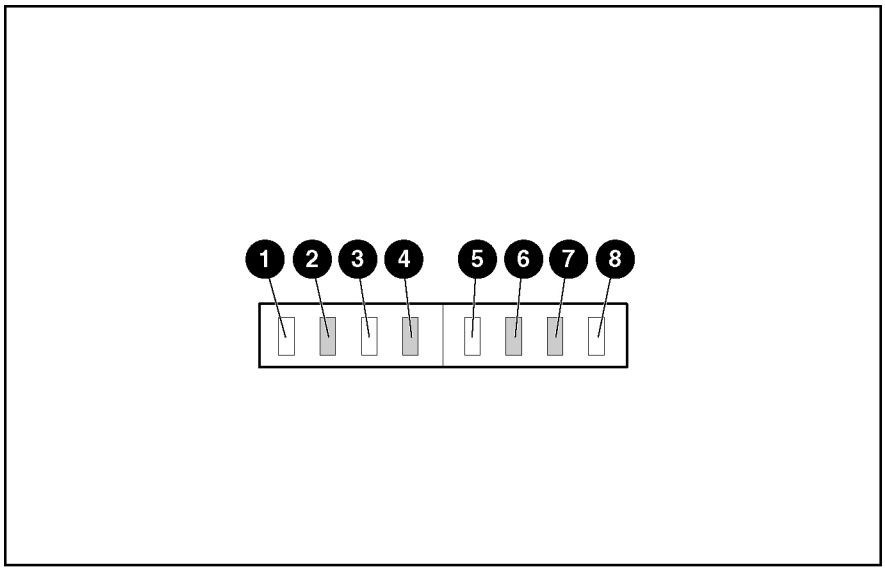

Figure 5-3: Sample port 84 reading

Table 5-3: Sample Port 84 Code

MSB LED	LSB LED	Status	Code
1		Off	0
2		On	1
3		Off	0
4		On	1
	5	Off	0
	6	On	1
	7	On	1
	8	Off	0

Using the code translation from Table 5-2, the resulting code would be 56.

Defining Port 84 Codes

Refer to Table 5-4 for a description of each port 84 code.

IMPORTANT: iLO port 84 codes may differ from port 84 LED codes. Table 5-4 defines port 84 codes for the system board port 84 LEDs only.

Table 5-4: Port 84 Codes Defined

Port 84 Code	Description
00	Init flags, MSW, IDTLIM
01	8042 Initialization/self-test
02	8042 received read command
03	No response from 8042
04	Look for manufacturing ROM at E0000
05	Look for manufacturing ROM at C8000
06	No manufacturing ROMs
07	Read CMOS reset code
08	Init 8259, 80287
09	Jump indirect indexed by reset code
0A	Vector via 40:67 reset function
0B	Vector via 40:67 with EOI function
0C	Boot reset function
0D	Test #2 8254 counter 0
0E	Test #2 8254 counter 2
0F	Warm Boot
10	PPI disabled, Program timers 0 & 1
11	Turn off disk motors
12	Initialize PICs and Timers
13	Test timer 0
14	Disable RTC interrupts
15	Check battery power
16	CMOS Battery has lost power
17	Clear CMOS_DIAGS
18	Test base memory (first 128K)
19	Clear and init base memory
1A	Unused
1B	Test the system ROM (not used in E12)

continued

Table 5-4: Port 84 Codes Defined *continued*

Port 84 Code	Description
1C	Test CMOS
1D	Test DMA controller & page registers
1E	Test keyboard controller
1F	Unused
20	Test real and extended memory
21	Init time-of-day
22	Init 287 coprocessor
23	Test the keyboard and interface
24	Reset A20 and set default CPU speed
25	Test diskette subsystem
26	Test fixed disk subsystem
27	Initialize SCSI drives
28	Perform search for opt & sys ROM
29	Test for valid system configuration
2A	Clear screen re-enable NMI
2B	Check for invalid time and date
2C	Boot
2D	Test timer 2
2E	Unused
2F	Unused
30	Clear RAM used for stack during POST
31	Load interrupt vectors 70-77
32	Load interrupt vectors 00-1F
33	Initialize MEMSIZE and RESETWD
34	Verify CMOS checksum
35	CMOS checksum is not valid
36	CMOS checksum valid/check battery power
37	Check for communication adapters
38	Check for serial ports
39	Check/initialize parallel printer ports
3A	Initialize port and comm timeouts
3B	Flush keyboard buffer init kbd queue
3C	Unused
3D	Unused

continued

Table 5-4: Port 84 Codes Defined *continued*

Port 84 Code	Description
3E	Unused
3F	Unused
40	Start of Base Memory test
41	Check RAM refresh
42	Start write cycle of 128K RAM test
43	Reset parity checks
44	Start verify cycle of 128K RAM test
45	Check for parity errors
46	No RAM errors
47	Got a RAM error
48	Unused
49	Unused
4A	Unused
4B	Unused
4C	Unused
4D	Unused
4E	Unused
4F	Unused
50	CPR test and setup POST
51	Base memory error during CPR reset
52	Start VDU option ROM search
53	Vector to VDU option ROMs
54	Ready to replace E000 ROM
55	Unused
56	Unused
57	Unused
58	Unused
59	Unused
5A	Unused
5B	Unused
5C	Unused
5D	Unused
5E	Unused
5F	Unused

continued

Table 5-4: Port 84 Codes Defined *continued*

Port 84 Code	Description
60	Start of memory test
61	Enter protected mode
62	Start memory sizing
63	Get CMOS expected memory size
64	Compare CMOS to detected
65	Start test of extended memory
66	Save size of real and extended memory
67	Update 128K-Option installed CMOS bit
68	Prepare to return to real mode
69	Back in real mode-test successful
6A	Back in real mode-error during test
6B	Display error messages
6C	End of memory test
6D	Unused
6E	Start of segment+CMOS test
6F	Start of MEMTEST for “found_size”
70	Start of MEMTEST
71	Test each RAM segment
72	High order address test
73	Exit MEMTEST
74	Parity error on bus after
75	Unused
76	Unused
77	Unused
78	Unused
79	Unused
7A	Unused
7B	Unused
7C	High order address test failure
7D	Entered cache controller test
7E	Programming memory cacheability
7F	Copy System ROM to high RAM
80	Start of 8042 test
81	Do 8042 self-test

continued

Table 5-4: Port 84 Codes Defined *continued*

Port 84 Code	Description
82	Check result from self-test
83	Fail self-test
84	Self-test successful init with 5Dh
85	Unused
86	Start kbd test, reset keyboard
87	Got acknowledge from test
88	Check result of kbd test
89	Test for stuck keys
8A	Key seems to be stuck
8B	Test keyboard interface
8C	Waiting for self-test timeout to fail
8D	End of test, no errors
8E	Unused
8F	Unused
90	Start of CMOS test
91	CMOS seems to be OK
92	Error on CMOS read/write test
93	Start of DMA controller test
94	Page registers seem OK
95	DMA controller OK
96	8237 (DMA Controller) Init complete
97	SMI init
98	SMI init – Secondary Processor
99	SMI occurred
9A	Unused
9B	Unused
9C	Unused
9D	Unused
9E	Unused
9F	Unused
A0	Start of POWER ON diskette tests
A1	Unused
A2	Unused
A3	Unused

continued

Table 5-4: Port 84 Codes Defined *continued*

Port 84 Code	Description
A4	FDC time-out error
A5	FDC failed reset
A6	FDC passed reset
A7	Unused
A8	Start of determine drive type
A9	Unused
AA	Unused
AB	Unused
AC	Unused
AD	Unused
AE	Unused
AF	Diskette tests complete
B0	Start of fixed drive tests
B1	Combo board not found, exit
B2	Combo controller failed, exit
B3	Testing drive 1
B4	Testing drive 2
B5	Drive error (error condition)
B6	Drive failed (failed to respond)
B7	CMOS RAM invalid or no fixed drives
B8	Fixed drive tests complete
B9	Fixed drive bootable
BA	Attempt to boot fixed drive
BB	Boot attempt failed
BC	Boot record read successful
BD	Drive error, retry booting
BE	Unused
BF	Unused
C0	EISA NVRAM check_sum
C1	Init mem map, copy ROM 2 RAM
C2	EISA IRQ initialization
C3	EISA DMA initialization
C4	PCI and EISA slot inits
C5	EISA display config error msgs

continued

Table 5-4: Port 84 Codes Defined *continued*

Port 84 Code	Description
C6	EISA PZ initialization began
C7	EISA PZ initialization done
C8	Verify Proc config
C9	Server Manager/R POST Self Test RMU
CA	Verify system/board revs
CB	Unused
CC	Autoconfigure PCI devices
CD	Unused
CE	Unused
CF	Unused
D0	Entry to clear memory routine
D1	Ready to go to protected mode
D2	Ready to clear extended mem
D3	Ready to reset back to real mode
D4	Back in real mode/loading IDT
D5	Clear base memory
D6	Entry into ATA code
D7	Finished searching for drives
D8	Finished programming IDE timing
D9	Start of check CD code
DA	End of check CD code
DB	Unused
DC	Unused
DD	Unused
DE	Unused
DF	Exit from ATA code
E0	Unused
E1	Unused
E2	Unused
E3	Unused
E4	Unused
E5	Unused
E6	Unused
E7	Unused

continued

Table 5-4: Port 84 Codes Defined *continued*

Port 84 Code	Description
E8	Unused
E9	Unused
EA	Unused
EB	Unused
EC	Unused
ED	Unused
EE	Unused
EF	Unused
F0	Unused
F1	Unused
F2	Unused
F3	Unused
F4	Unused
F5	Unused
F6	Unused
F7	Unused
F8	Unused
F9	Unused
FA	Unused
FB	Unused
FC	Unused
FD	Unused
FE	Unused
FF	Unused

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